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1947

Handbook in woodworking for special  
class teachers.





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HANDBOOK IN WOODWORKING FOR  
SPECIAL CLASS TEACHERS

Submitted by

Joseph Carroll Lonergan  
(B.S., Fitchburg State Teachers College, 1942)

In partial fulfillment of requirements for  
the degree of Master of Education

1 9 4 7

First Reader: Dr. William C. Kvaraceus, Asst. Prof. of Ed.  
Second Reader: Franklin C. Roberts, Prof. of Education  
Third Reader:



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28413



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## CHAPTER I

### The Special Class Student or Mentally Retarded Child

## CHAPTER I

### THE SPECIAL CLASS STUDENT OR MENTALLY RETARDED CHILD



CHAPTER I

THE GENERAL CLASS SYSTEM IN AMERICAN SOCIETY



## CHAPTER I

### The Special Class Student or Mentally Retarded Child

It is obvious that children who are born with insufficient gray matter are limited in the ability to learn. Thus idiots and imbeciles are capable of progressing so far and no farther. But the presence of a normal brain does not mean that the mental processes will grow along normal lines. In each classroom there are pupils who have difficulty with their grades.

In some instances physical defects such as poor vision or hearing, may be a factor. But others show signs of emotional immaturity and are often classified as "nervous". Through improper training or an unwholesome environment, the child is in a state of tension or confusion. The mind is called upon to assume the task of mastering reading and writing while still having trouble adjusting to ordinary daily living.

Occasionally injury to the brain is responsible; now and then infection will leave a scar resulting in a specific disturbance. The mentality in general may be affected in only a small field. Thus Johnny bungles arithmetic but does well in drawing or reading; Mary has no ear for music and cannot achieve a sense of rhythm but she may be good in sewing. Few of us excel in all skills and it is entirely possible that



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some childhood ailment has left its mark on a certain segment of our brain tissue.

All too often the teachers are blamed for the child's lack of progress. These men and women have all they can do to teach the regular students. They are not jack-of-all-trades nor experts in child psychology. If they but recognize the defects and inform the family or authorities, their job is done.

#### Identifying the Mentally Retarded for Special Class Placement

The problem of indentifying those mentally retarded pupils who would profit from special class placement or differential treatment is twofold:

1. Systematic initial screening and referral for individual study.
2. Individual study and diagnosis of all subjects.

Research and experience have revealed that the initial screening cannot be left solely to the unaided observations of the classroom teacher, nor can the final placement in a special class be determined by the results of any single individual test of intelligence.

#### Systematic Initial Screening

1. Use of age-grade progress charts.
2. Use of group tests of intelligence.
3. Use of group tests of achievement.
4. Use of individual examinations.
5. Use of teacher's daily observations in the classroom.



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### Individual Study and Diagnosis Using Fernald's Ten Fields of Inquiry.

1. Physical Examination
2. Family History
3. Personal and Developmental History
4. History of School Progress
5. Examination in School Work
6. Practical Knowledge
7. Economic Efficiency
8. Social History and Reaction
9. Social Conduct
10. Psychological Tests

### Recommended Action based on Through Study of the Individual Child.

1. For school placement
2. For curriculum and teaching methods
3. For future occupational adjustment
4. For present and future social adjustment
5. Others

### Frequency:

Frequency of the "mentally retarded" children are those who constitute at least 2 to 5 percent of the juvenile population.

The curriculum of the public schools is based primarily upon the abilities of the great number of average children. Educators have been rather slow to perceive the presence among pupils of what we might call the slow learners. Formerly the slow pupils were supposed to differ from the average in will power or in disposition, rather than in respect to the fundamentals of ability to learn.

It has been found that incapacity for academic achievement which to some extent characterizes about 25 percent of the elementary-school children, becomes more and more pronounced



Psychological and Physiological Basis of Learning

1. Psychological Basis
2. Learning Theory
3. General and Developmental Psychology
4. Theory of Mental Processes
5. Learning in Social Context
6. Psychological Knowledge
7. Learning Principles
8. Social Learning and Motivation
9. Social Learning
10. Psychological Basis

Psychological Basis of Learning in the Classroom

1. Learning Principles
2. Learning Theories and Concepts
3. Learning Theories and Concepts
4. Learning Theories and Concepts
5. Learning Theories and Concepts

Conclusion

The purpose of this study was to investigate the psychological basis of learning in the classroom. The results of the study are presented in the following sections.

The results of the study show that the psychological basis of learning in the classroom is a complex process. It involves a number of factors, including the learner's characteristics, the learning environment, and the learning process itself.

The results of the study also show that the psychological basis of learning in the classroom is a dynamic process. It changes over time as the learner's characteristics and the learning environment change.

The results of the study suggest that the psychological basis of learning in the classroom is a complex process. It involves a number of factors, including the learner's characteristics, the learning environment, and the learning process itself.

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as degrees of intelligence become less. The least intelligent children, those having intelligence quotients below 50 on the Stanford-Binet scale, are incapable of attaining any effective control over words and numbers. Even those who test as high as 75 IQ are capable of only limited degree of literacy. About 2 percent of an unselected school population have an intelligence quotient of 73 or less, and about 5 percent have an intelligence quotient of 78 or less.

The less retarded but still intellectually subnormal children, those rating from about 78 to 90 IQ, have not as yet received much explicit attention in the organization of the public schools. Yet their needs are just as important as those of the least capable group and should be met through the adjustment of the school curriculum.

### Mental Ability

All pupils can deal with things, persons and abstract symbols, but in vastly different degrees of complexity. Theoretically, a retarded child of any chronological age can acquire the information related to school subjects which normal 6-year-olds acquire, when his "mental age" is 6, as determined by standardized mental tests. Generally speaking, it is possible by means of available methods of mental measurement to tell when a particular pupil is "ready" to learn abstract symbols and to what extent he will be capable of mastering these. This principle applies to groups rather than to indi-





viduals, and that here, as elsewhere, exceptions occur that must be treated in keeping with the needs of the individual case.\* Through research studies it has been found that most mentally retarded children can learn to work with concrete materials and objects better than they can learn to work with symbols or abstract ideas; and as a group they can learn about as much as their "mental age" may indicate, in terms of what average children of that same age accomplish.

As for emotional experiences, the mentally retarded have all the ordinary human emotions. They "have feelings", and their feelings are much more like those ordinary persons, apparently, than their intellectual abilities are. They are made happy or sad, as their desires are gratified or not; are capable of affection, discouragement, and all the other emotional experiences common to man.

#### Capacities, Limitations and Interests

\* The need of educating each child in keeping with his capacities, limitations and interests is very important. While this philosophy applies to all children, it becomes more imperative in dealing with mentally retarded pupils because their limitations are greater and their interests are less varied and less extensive than those of normal children. It is tragic to see a mentally retarded child drilled by a teacher hour after hour on a subject in which he has no interest, and which is beyond his capacity to understand, and which he has little if





any prospect of ever associating in real life.

If a child is in a special class he has already demonstrated a certain lack of capacity to learn.\* It is a waste of time for the teacher to attempt to force such a child to master academic goals that are beyond his mental capacity. The curriculum should be so organized that units of instruction may be provided to fit varying abilities. The teacher should help each child advance as far as his capacity permits him to go with a reasonable amount of teaching effort but, lacking the capacity to do standard school work,† she should offer him something different which will better suit his needs rather than merely less of the general curriculum.

#### The Aims in Education

The special class student must have an education whose experiences, first of all, fostered day by day:

1. Experience social relationships that will enable him to find friends and to participate in social experiences.
2. The knowledge to keep healthy and physically fit in order to enjoy life to its fullest.
3. The ability to plan and select worthwhile leisure time activities.
4. The ability to select and prepare his own food, select and care for his own clothes, and to keep his home neat and clean.
5. The ability to earn an income in order to secure as many of the necessities of life as possible.
6. Consumer training in order to spend his salary wisely; and enough general knowledge of the products necessary in sustaining life to give meaning to their use.

The basic philosophy underlying the education of retarded children is no different from that recognized for all children.





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The fundamental aim of all education is to teach children to live wisely and well in the environment in which they find themselves.



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live wisely and well in the environment in which they live  
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S U G G E S T E D   R E A D I N G

Abel, Theodora M., and Kinder, Elaine F. The subnormal adolescent girl. New York, Columbia University Press, 1942. 215 p.

The authors discuss the girl within her home, at school, in industry, and in an institution. The community's problem in dealing with the subnormal girl is considered, and suggestions made for the control of the situation. Case studies are used in abundance as illustrative material.

Allen, Arda Talbot. Cogs in the occupational wheel. Occupations, 20:15-18, October 1941.

A counselor in the San Antonio (Texas) Vocational and Technical School describes a program under way whereby students of low intelligence in junior high school are transferred to the "Arts and Crafts" school, where they are given occupational training centered about a general shop (for boys) or a homemaking shop (for girls). All subjects of the curriculum are coordinated with the projects carried on in these shops.

Anderson, Meta. Education of defectives in the public schools. Yonkers-on-Hudson, N.Y. World book company, 1917. 104 p.





Discusses selection of children, the curriculum of the special school, and its place in the public-school system and in the community. Special attention is here called to chapter 4 of the book, which deals with curricular activities for young children or retarded mental development.

Anonymous. Not like other children. Parents' Magazine, 18:34, 98-101, October, 1943.

A mother's story of how she and her husband faced the problem of the mental deficiency of their child, and of how they assumed the responsibility for his physical development and happiness. The desirable attitude of parents toward this problem in the home is very clearly defined.

Baier, Maj. Donald E. The marginally useful soldier. American journal of mental deficiency. 48:62-66, July 1943

A major in the Adjutant General's Office in Washington, D.C., points out the type of mentally retarded men who can become useful in the Army.

Beamen, Florence N. The intangibles of special education.

Journal of exceptional children, 9:231-35, May 1943.

Calls attention to the essential needs of mentally retarded pupils as (1) harmonious living with contemporaries, (2) realistic and firsthand experiences in knowing and using environment, and



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(3) gradual introduction to the world-of-work in which they ultimately will take their part.

Urges the schools to adopt a realistic program which will make it possible for retarded children to make needed adjustments upon leaving school.

Bennett, Annette. Reading material and the retarded reader. Educational forum, 6:280-93, March 1942.

Points out the necessity of selecting reading material which will arouse the interest and touch the experiences of the retarded or average reader. Gives suggestions for building up the vocabulary of a child who has a special interest but not the ability to read available material about it.

Berry, Richard J.A., and Gordon, R.G. The mental defective: a problem in social inefficiency. New York, McGraw-Hill book company, 1931. 146 p.

A general introduction to the problem of mental deficiency in its physiological and social aspects. Deals with the general nature of the problem, the neurological basis of mental deficiency, the social implications involved, and recommended treatment.

Blair, Glenn Myers. The one hundred books most enjoyed by retarded readers in senior high schools. English journal, 30:42-47, January 1941.





The author is codirector of the reading clinic of the College of Education of the University of Illinois. The list presented is made up of those books which 217 senior high school teachers in the United States have found to be read with enjoyment by unusually poor readers.

Burt, Cyril. The subnormal mind. New York, Oxford university press, 1935. 368 p.

An extensive treatise devoted in part to the psychology and treatment of subnormal children. Consideration is given also to juvenile delinquency and children's personality difficulties. Written by an English author of note in the psychological field.

Carpenter, Helen M. Gateways to American history. New York, the H.W. Wilson Company, 1942. 255 p.

An annotated graded list of books for slow learners in junior high school.

Coman, William M. Conservation of materials and the use of salvage. American School Board Journal, 105:21-22, August 1942.

A supervisor in the Business Division of the Los Angeles city schools cites ways in which industrial arts instructors can recondition and use salvaged metals, wood textiles, and other stock for the creation of many attractive and useful articles.



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Descoeudres, Alice. The education of mentally defective children. (Translated from the French by Ernest F. Row.) New York, D.C. Heath and company, n.d. 313 p.

Describes the general organization of special schools and classes for the mentally deficient in Europe. Discusses school programs and methods to be used in teaching various subjects of the curriculum in special classes. Also gives suggestions for games and for projects in hand work and other fields.

Educational provisions for mentally deficient adolescents.

A symposium. American Journal of Mental Deficiency, 47:79-95 July 1942.

Representatives of several residential and day-school systems describe the program under way in their respective locales, with particular emphasis upon work experience and training for occupational adjustment. Newark, N.J., Boston, Mass., Detroit, Mich., Wayne County Training School, Letchworth Village, and Southbury Training School are the systems represented.

Featherstone, Wm. B. The curriculum of the special class.

New York, Bureau of publications, Teachers college, Columbus university, 1932. 157 p. (Contributions to education, no. 544).





The author condemns "the subject matter-set-out-to-be-learned policy" and urges that teachers of special classes use their "opportunity to make possible a truly significant educational experience for pupils" through first-hand contacts with life values.

Gesell, Arnold. The retarded child: how to help him.

Bloomington, Ill. Public school publishing company, 1925. 100 p.

A manual of practical suggestions for planning an individual program involving a variety of activities, handicraft, and vocational work for the deficient pupil.

Haskell, Robert H. One hundred institutionalizes mental defectives in the armed forces. American Journal of Mental Deficiency, 48:67-71, July 1943.

Presents data concerning boys who have been at the Wayne County Training School and have served usefully in the armed forces.

Hefferman, Helen; Richards, Irmagarde; and Salisbury, Alice. Desert treasure. San Francisco, Harr Wagner Publishing Company, 1942.

A new type remedial reader. Reading level, fourth grade; interest level, seventh and eighth grades.

Heyerdahl, Tordis M. A library program for the feeble-minded. American Journal of Mental Deficiency,





47:318-25, January 1943.

The librarian at the Minnesota School for Feeble-Minded lists the books which have been used successfully at that institution in arousing the interest of pupils at the school and in meeting their needs for reading activities.

Hollingworth, Leta S. The psychology of subnormal children. New York, Macmillan company, 1920. 288 p.

This book is addressed primarily to the large group of teachers who are working with mentally deficient children. Provides a basic knowledge of the psychology, physical traits, and general nature of the mentally deficient.

Horsefield, Ethel. Suggestions for training the mentally retarded by parents in the home. American Journal of Mental Deficiency, 46:533-37, April 1942.

A teacher at the Belchertown State School in Massachusetts gives certain basic principles and outlines activities that parents can use in guiding the development of mentally deficient children in the home.

Ingram, Christine P. Education of the slow-learning child. Yonkers-on-Hudson, New York, World book company, 1935. 419 p.

On the basis of extensive supervisory experience in a city school system, the author discusses





physical, psychological, and educational phases of the problem of mentally retarded children. Much practical information is given regarding instructional content and methods.

Inskeep, Annie D. Teaching dull and retarded children.

New York, Macmillan Company, 1926. 455 p.

The author is an experienced teacher of mentally retarded children. She gives numerous concrete suggestions as to the type of instruction which has been most effective in her own classroom. Includes discussions of reading, language, spelling, arithmetic, and other usual subjects of the curriculum, with some attention also to games and the "education of the hand."

Irwin, Elizabeth A., and Marks, Louis A. Fitting the school

to the child. New York, Macmillan company, 1924. 339 p.

Gives an account of the results of classifying the pupils of a large elementary school by means of intelligence tests and of methods used in diagnosing and treating children's difficulties. Emphasizes the need of adapting school work to the capacities of children in order to preserve mental health and develop wholesome personality.

Jackson, George T. Each according to his ability. School executive, 62:37-38, January 1943.

Describes methods used in the grade schools of





Conshohocken, Pa., for children in the low-ability groups. "By bringing classwork down to their working level, by making instruction as interesting as possible, by recognizing pupil effort, and by giving the low-ability pupils an opportunity to participate in school activities, we feel we have gone far toward solving the problem.

Kanner, Leo. Exoneration of the feeble-minded. The American Journal of Psychiatry, 99:17-22, July 1942.

A plea for proper education and supervision of the "intellectually inadequate," whose services constitute a real contribution in American democracy. "They can in our own culture achieve success as farm hands, factory workers, miners, waitresses, charwomen."

Kelly, Elizabeth M. Organization of special classes to fit the needs of different ability groupings. American Journal of Mental Deficiency, 48:80-86, July 1943.

The supervisor of the department of special education in Newark, N.J., discusses the program under way in that city under the topics of "Organization," "Program," "Personnel," "Placement and Follow-up."

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Preparation of the mentally handicapped child for the postwar world. Journal of Exceptional Children, 10:146-50, March 1944.



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Outlines a training and guidance program to be used in the preparation of the mentally retarded for participation in the world of work. Lists jobs secured by boys and girls of prevocational groups and indicates the range of salary received. The author states that the success of the program rests in early, proper classification, and gives as a suggested grouping children who have CA's of 14 to 16, IQ's of 65 to 78, and SQ's of approximately 80.

Lee, Jane. Fiction and local history in a special class. Social education, 5: 107-09, February, 1941.

A teacher describes how she aroused the interest of a special "slow" class of high school children in their community by reading books and seeing movies based upon familiar locations, scenes, and people.

Martens, Elise H. and Ingram, Christine P. Educational programs in residential schools. American Journal of Mental Deficiency, 46:386-94, January 1942.

Report of a study made by the American Association of Mental Deficiency and the U.S. Office of Education. Discusses trends in residential school programs, the teaching staff, the curriculum, and certain items relating to pupil population.





McIntire, Gloria. Let pictures tell the story; retarded pupils get simplified job information. Occupations, 20:124-26, November 1941.

Describe a course in "Job English" given in a Los Angeles high school for retarded boys from 14 to 18 years of age, with IQ's from 75 to 50.

Minster, Maud. Classroom adaptations for pupils of limited ability. Clearing-house, 18:226-29, December 1943.

The librarian of the Senior High School, Altoona, Pa., presents suggestions on curriculum adaptations and classroom activities helpful in meeting the problems of limited ability children. These are based upon her cooperative work with the teachers, and deal particularly with library activities.

Morgan, John J.B. Psychology of the unadjusted school child. New York, Macmillan company, 1936. 346 p. (Revised Edition.)

A very readable discussion of the difficulties of school children from the standpoint of behavior and personality, and of the possibilities within reach of the teacher in helping to remove such difficulties.

National Education Association. High School methods with slow learners. Washington, D.C., the association. 87 p. (Research bulletin, Vol. 21, No. 3, Oct. 1943)



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Report of a research study carried on in cooperation with city school systems of the provisions made in high schools to meet the needs of slow-learning pupils who were "distinctly below the average in general intelligence or in a specific aptitude, or in both". Opinions of administrators regarding desirable adjustments were also secured. Concluding statements regarding a number of factors involved in the study are reduced from the information collected.

Parham, Lillian C. Teaching low IQ's to read. English Journal, 32:560-62, Dec. 1943.

Definite suggestions are presented for the teaching of reading to the children of low I.Q. It is advised that much attention to training through the senses be given using much illustrative material. An illustration of the teaching of a particular story is given.

Pieratt, Ida Mae. The low ability student in business education, 9:13-15, May 1943.

Gives suggestions concerning special courses and training suited to the capacities of slow learners for the types of jobs they are able to fill.

Rautman, Arthur L. Educational objectives for institutionalized mental defectives. Mental Hygiene, 27:55-62





January 1943.

The psychologist at the Northern Wisconsin Colony and Training School emphasizes the factor of individual differences among pupils in training schools. Discusses several fields of the curriculum and urges a unified effort on the part of the entire institutional staff to improve the educational program.

Rhodes, Gladys L. The nonacademic part of our program for the mentally retarded. Journal of Exceptional Children, 9:107 -11, 119-20; 145-48, 154: 180-83, January, February, March 1943.

Sagul, Edith A. Procedures in clothing instruction in classes for the mentally retarded. Journal of Exceptional Children, 10:16-22, October 1943.

Procedures in clothing instruction in classes for the mentally retarded. Points out objectives which the teacher should keep in mind in formulating a plan of work in clothing for retarded pupils and indicates the points of common emphases in relation to art, reading, arithmetic, language, social studies, health, and science.

Schmidt, Bernadine G. A program for the mentally handicapped. Occupations, 21:222-25. November 1942.



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Editor's note: "With a war program demanding effective use of all available manpower, the mentally handicapped take on greater significance as part of our national resources. While vocational guidance for this group follows in general the regular pattern, the author here points out the special techniques called for."

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Current administrative practices in educational provisions for the mentally retarded. Educational Administration and Supervision, 28:541-45, Oct. 1942

A discussion of the various theories regarding the problem of grouping children, particularly as relates to the mentally retarded; types of segregation used; methods of selection; administrative plans for selection; methods of transfer to special schools and classes; responsibilities of teachers.

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Developing competency in America's retarded adolescents. Social education, 6:119-22; 168-71, March, April 1942.

A teacher of retarded children discusses (a) competence in learning and (b) political and social competence as developed in a group of retarded adolescent girls in a special class in Chicago.

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Reading habits and interests of mentally re-



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increased with the concentration of the solution.

tarded girls. Elementary English review, 19:273-81, December 1942.

"This report is the story of an attempt to develop an effective reading program built upon the needs and interests of 116 retarded girls in several consecutive classes in a Chicago school." Special experiences were provided which were related to reading experiences until favorable results in development of reading experiences were achieved.

Sidis, Helena. War geography for the handicapped child.

Social studies, 34:108-09, March 1943.

Points out that for the handicapped, distance, directions, and geographical measurements have little meaning. Gives suggestions for aiding such pupils in an understanding of the war situation and geographic locations.

Slater, Russell. Books for youth who dislike reading. Ohio State University Press, 1941, 16 p. (Bulletin No. 2 of the Ohio Conference on Reading.)

Intended to meet the needs of youth who require material in which the interest level is several grades higher than the reading level.

Spalding, W.B. and Kvaraceus, W.C. "Journal of Exceptional Children" Vol. 11, No. 2, November 1944, pp 42-44.

The authors made a survey of the current practices





in providing adjustment classes in New York, Connecticut, and New Jersey. Marked sex differences were noted in the enrollments of adjustment classes for those handicapped in terms of academic ability and speech patterns. The authors conclude "These findings should raise serious questions in the minds of school administrators as to criteria being used to place children in these so-called adjustment classes. Stevens, G.D. Some problems related to the education of the slow-learning adolescent. School review, 51:550-54, November 1943.

Points out some of the special and immediate problems which must be tackled in connection with the education of the slow-learning child, many of whom are now encountered in high schools owing to compulsory attendance laws. "High schools will have to attack these problems from a realistic point of view and will have to provide personnel and equipment that will give the slow learner his fair share of education."

Stevens, G.D. "Suggested Criteria for Selection of Items for a Cumulative Case Study Record Folder for the Mentally Retarded. Journal of Educational Research, 39:201 9. November 1945.





The author argues for the need of a case study record folder for use in classes for the mentally handicapped and suggests criteria for the choice of items to be included in the cumulative case study records.

Stone, Charles, and Schmidt, Bernardine G. The post-school adjustment of mentally handicapped girls. Educational administration and supervision, 29:231-41; 284-94; 321-44, April, May, September, 1943.

A series of articles describing adjustments of girls trained in the Lower Vocational Centers in Chicago and leaving school between the fall of 1938 and September 1941. The number of subjects totaled 132. The authors consider home environment, school environment, and activities in post-school period. "At the close of the investigation, the majority of the subjects appeared to have made satisfactory progress in either school or employment, many of them having achieved additional training of their own volition."

Street, Roy F. Administrative techniques for caring for mental deviates. Journal of Exceptional Children, 10:45-50, November 1943.

A consulting psychologist engaged in private practice describes what has been done in some schools in attempting to meet the problems of





mental deviates without resorting to special classes. The author believes that "the special class is justified only when the school and community organization is such that the advantages outweigh the disadvantages. These advantages will diminish rapidly as all teachers organize their work to care for a wide range of activity, and as these teachers become better informed about child growth and development."

Sullivan, Lynn C. Occupational guidance for the high-grade mental defective. Journal of Exceptional Children, 9:3-6, October 1942.

The senior vocational supervisor at the Wayne County Training School calls attention to factors that need to be considered in preparing high-grade mental defectives to take their places in occupational life.

Terman, Lewis M. The intelligence of school children. New York, Houghton Mifflin company, 1919. 317 p.

One of the earlier publications on the problem of individual differences in intelligence, with attention to the use of psychological tests in discovering such differences.

Wallin, J.E. Wallace. The classroom teacher and child guidance, particularly with respect to handicapped children. Journal of Educational Research, 36:321-34,





January 1943.

The director of special education and mental hygiene of the Delaware Department of Public Instruction discusses the fundamental principles of any guidance program and their particular application to the mentally handicapped. Adequate diagnosis enriched educational experiences, exploratory activities, and placement service are considered essential elements of the program.

Whipple, Helen Davis. Making citizens of the mentally limited. Bloomington, Ill., Public school publishing company, 1927. 374 p.

Discusses the subject matter to be taught in segregated special classes of public schools. Places emphasis upon those materials which meet a present need of the pupil and appeal strongly to his interests. Adds to the work in the three R's practical application of the manual arts, citizenship, character, and health education.

Whitted, Dorothy J. and Carpenter, Helen McCracken. Reading they've liked. English Journal, 32:440-44, October 1943.

Considers reading materials of interest to children of below-average intelligence. Examples of books liked by boys, by girls, and by boys and girls are listed, as they were discovered





through a free reading experiment with 175 slow-learning pupils in junior high schools of metropolitan, urban, and rural areas.

NOTE. - For other articles dealing with mentally deficient and backward children, see especially the successive issues of the "American Journal On Mental Deficiency", the "Training School Bulletin", and the "Journal Of Exceptional Children".

#### CHAPTER II

#### THE UNIT OF ACTIVITY



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## CHAPTER II

### THE UNIT OF ACTIVITY

## CHAPTER II

### THE UNIT OF ACTIVITY



THE UNIVERSITY OF CHICAGO

THE UNIVERSITY OF CHICAGO

THE UNIVERSITY OF CHICAGO

CHAPTER II

THE LIFE OF ACTIVITIES

## CHAPTER II

### The Unit of Activity

Some of the special class teachers have many difficulties which arise from a failure to recognize handwork, such as woodworking, is not a separate school subject, but an integral part of the teaching procedures in all special class subjects. Many of these teachers have trouble and find it a difficult task to teach handwork because they are ignorant of handwork techniques used and the variety of hand tools and construction materials that are available. A teacher who takes it upon herself to give her pupils experiences through handwork, of any sort, must herself be well equipped. She should have experience, and understand various techniques in manipulative work, being able to do the construction work with a fair degree of proficiency, and must know how to properly teach these techniques to her special class pupils. A knowledge of Industrial Arts and Manual Arts should be as much a part of her professional training as Methods of Teaching Special Class Students, Psychology, or Mental Testing.

\* The following plan is present to aid the teacher in a special class to teach woodworking, knowing how to use handwork techniques, not as ends in themselves, but as a part of other teaching procedures to insure complete learning experiences





for the pupils.

The unit of activity as used in this plan designates a broad learning situation which provides the special class pupil with opportunities for observing, investigating, planning, problem-solving, constructing, evaluating, and correlating; involving the use of such school subjects as English, Spelling, Arithmetic, Geography, General Science, Hygiene, Safety, Drawing, Industrial Information and Consumer Training.

Learning through the unit of activity merely means utilizing in the classroom all of the many different ways of learning. When properly taught, learning through activities can do so much more for the special class student. It leads to better habits and attitudes. It furnishes an opportunity to observe more closely helping to discover and remedy each pupil's maladjustments. It helps develop the pupils interest. It furnishes opportunities for meaningful and effective drill in tool subjects. In a good activity program pupil information covers a wider area and is much greater in quantity than under the old formal method of teaching the slow learner.

Before starting a unit of activity the teacher should try to create interest on the part of all her pupils. Many teachers have realized that the learning process is quickened when the pupils are interested. In a unit of activity the teacher begins with the interests of the children themselves. She builds on these interests, capitalizes them, and gets the children's whole-hearted devotion to the work at hand. From



to the public.

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that approach she skillfully weaves into the pupil's learning the things which she knows are essential for their education and happiness. The school work or subjects will be decided by the present interests of the children instead of being dictated by the course of study or the teacher.

A teacher planning to use or build a unit of activity should analyze her specific learning situation by answering the following questions:

1. What are the specific needs, both academic and manipulative, of my particular group?
2. What are the abilities and capacities of my group; at what grade level do they reach?
3. What are my specific aims and objectives?
4. How much time can I justify for this unit?
5. What facilities are available in my classroom, or in the school building?
6. What types of outside of school activities will be of educational value to my pupils?
7. How can I test for desirable outcomes?

#### Planning the Unit of Activity:

\* First, I made a complete list of specific vocational needs for ungraded children in Woodworking. Including in these specific vocational needs Materials, Tools, Operations, School Activities, such as English, Spelling, etc. and including Industrial Experiences, Industrial Information and Consumer Training.

Next, I select a project in a particular area, and then





pick from the list of specific objectives in that area, all the objectives and varied experiences the project will include in its construction. In this way I know exactly what I am going to teach with each project. I may not be able to cover every objective or experience in the unit; but I'll know just what ones I did cover so in planning the next unit and project I can bring in the objectives and experiences that need to be repeated and the ones I missed in the preceeding unit.

Unit of Activity Outline:

1. Major Aims
2. Project
3. Job Plan
4. Approach
5. Activities
  - a. English
  - b. Spelling
  - c. Arithmetic
  - d. Geography
  - e. General Science
  - f. Hygiene
  - g. Safety
  - h. Drawing (Freehand or Mechanical depending upon the student)
  - i. Industrial Information
    1. Materials
    2. Supplies
    3. Equipment
  - j. Consumer Training
    1. Realization of the Need of the Article
    2. Selection of the Article
    3. Purchase of the Article
    4. Care of the Article



The first of these is the fact that the  
 project is not a simple one. It is a  
 very complex one, and it is one that  
 requires a great deal of time and  
 effort. It is a project that is  
 very important to the future of the  
 country, and it is one that is  
 very difficult to carry out. It is  
 a project that is very important to  
 the future of the country, and it is  
 one that is very difficult to carry out.

Project Objectives

1. To establish a...
2. To develop a...
3. To create a...
4. To improve the...
5. To increase the...
6. To reduce the...
7. To enhance the...
8. To promote the...
9. To support the...
10. To ensure the...
11. To maintain the...
12. To monitor the...
13. To evaluate the...
14. To report the...
15. To disseminate the...
16. To implement the...
17. To complete the...
18. To achieve the...
19. To reach the...
20. To attain the...

6. Drawing and Illustration of the Project Selected
7. Testing Activity for desirable outcomes.

### CHAPTER III

#### UNIT OF ACTIVITY





SAMPLE UNIT OF ACTIVITY





## CHAPTER III

Sample Unit of ActivityA Unit of Activity in Building a Simple End Table1. Major Aims:

To build a simple end table, with the aim of teaching the proper handling, use, and origin of the common woodworking tools. I want to create their interests in this particular project with the idea of weaving into it all their other school subjects or other learnings which I know are essential for their education.

2. Job Plan:

- |                         |   |
|-------------------------|---|
| 1. Shop                 | Woodworking   |
| 2. Class                | General Woodworking (Ungraded)  |
| 3. Purpose of Article   | To be used in the home for holding small lamps or ash trays or a table model radio. |
| 4. Parts of the Article | Top, Shelf, and three legs.   |
| 5. Drawings             | Rod layout full size  |
| 6. Material             | Whitewood, Pine or Gum Wood (Gum Wood preferred if you can get it.)                 |
| 7. Supplies             | Screws, brads and glue  |
| 8. Tools                | General Woodworking tools   |

OperationsDirections and Information

- |                                       |  |
|---------------------------------------|--|
| 1. Make out job card and a stock bill | Fill in as much as possible. The correct sizes are taken |
|---------------------------------------|--|





2. Get out the stock.

from the drawing. The rough size is marked when the stock is cut.

Get out the stock according to specific directions. Select the stock for the legs first; use 1" stock. For the top and shelf also use 1" stock, try to select full width. It is very important that this top and shelf are stored with cleats, for the circulation of air. Mark name plainly on each piece of wood.

### The Top:

1. Surface to thickness:

Use the rules of planning, consult the drawing for correct measurements.

2. Joint the top:

Follow the rules set up for making a good spring joint. Joint both places from the same end. Match the grain as well as possible.

3. Glue the top:

Rehearse clamping. Get the instructor's O.K. on the glue and the set-up before glueing.

4. Remove the surplus glue:

Use the plane or a sharp chisel.

5. Cut the top and shelf to desired shape:

See the drawings and cut one half of an inch over finished size. Use hand jig saw or a compass saw.

6. Measure, mark and cut out places on the top and shelf where the legs will fit into, to be joined:

See the drawing for proper measurements of these cut-outs.

7. Smooth both sides of table top and shelf smooth.

Use a jack plane and two grades of sandpaper, No. 2 and No. 00.





- |  |   |
|--|---|
| 8. Make edges of the table top and shelf smooth. | Use a spoke shave and two grades of sandpaper No. 2 first then No. 00. Cut a block to fit the edge for sanding. |
| 9. Sand the top:                                 | This is done last of all on the table.  |

The Legs:

- |  |   |
|--|---|
| 1. Plane to thickness.                     | Plane to 5/8 inches.  |
| 2. Using templet draw outline of the legs. | Make sure the grain of the wood runs along the length of the legs.          |
| 3. Cut the legs out.                       | Use a rip saw and keep close to the line.                                   |
| 4. Shape the legs.                         | Use a jack plane to obtain the desired shape having them smooth and square. |
| 5. Smooth the legs.                        | Use No. 0, finish with No. 00 sandpaper.                                    |

The Assembly:

- |   |   |
|---|---|
| 1. Fit each leg to a cut-out and number them.     | Use a chisel, 1 inch size.  |
| 2. Assemble each leg in its proper cut out.       | Use $1\frac{1}{2}$ - 18 brads to hold the legs in place. Do not fully drive these brads. This is a check before gluing. |
| 3. Glue and fasten the legs to the top and shelf. | Practice gluing first. Use glue and $1\frac{1}{2}$ - 8 flat head screws.  |
| 4. Sand table.                                    | Use two grades of sandpaper, No. 0 and No. 00.  |
| 5. Round all corners.                             | All corners are slightly rounded with sandpaper No. 00.   |
| 6. Final check.                                   | Check for glue, dirt, or roughness.   |

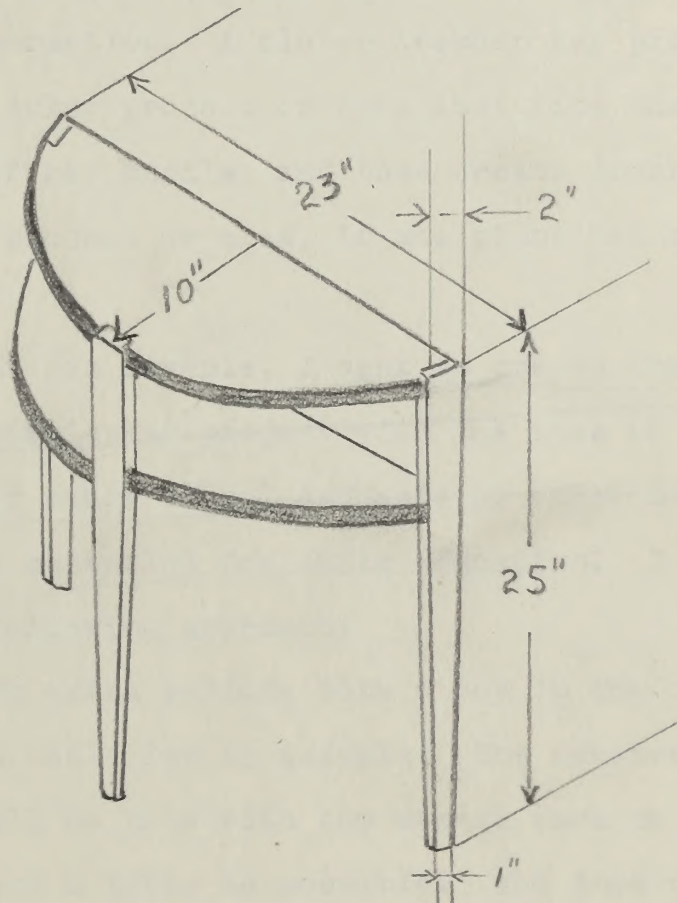




Illustrations of Simple End Table

Top and shelf made of 1 inch stock.

Legs made of 1/2 inch stock.







### 3. Approach:

How shall the teacher start a unit of activity? This is a problem of utmost importance. She must think about it carefully and plan it fully before selects her method of approach. There are many methods of approach, perhaps the simplest one is merely to allow the pupils to talk and to note the subjects or projects of greatest interest brought up in their conversation. A clever teacher can pick beforehand a particular project or area that fits the abilities and capacities of her pupils, and then create interest in this particular project or area, if she plans her approach properly.

\* In this unit for example, I want to create their interest in this particular project with the idea of weaving into it all their other school subjects or other learnings which I know are essential for their education. I will start with the following approach:

I would work extra periods with a boy in the class to construct an end table for an example. The construction and the finishing will be done with the utmost care so we will produce as perfect a table as possible. The idea of having a boy from the class do the work under close supervision is to show the group that the table can be constructed by each and every boy in the class. I have found that once a boy sees another boy in his class finish a project he immediately gets new inspiration, feeling that the task is not so





difficult.

Next I would bring into the shop a cheap, poorly constructed, poorly finished table, telling the class I bought it and I want them to tell me what they think of it, for the price I paid. I'll next show them what is wrong with the table I bought, and what I think the real cost should be. The end table that was made for an example will now be shown telling them that it was made by a boy in their class. Next we will compare these two tables. The pupils' conversations and questions will lead to a discussion, during the course of which the unit of activity can be developed further. Pictures will be placed all over the room showing the different styles and uses of the end table. I will ask them to see just how many end tables they can find in the homes they go into either working or visiting. My idea is to show them just how uncommon this particular end table is today, and to bring into the class their outside interests.

#### 4. Activities:

##### 1. English

- a. Read and talk about instructions for carrying on the work.
- b. Copy written directions.
- c. Repeat oral directions.
- d. Use shop expressions and trade terms.
- e. Write notices and reports.





- f. Use commercial forms, write orders for the materials in the articles that are being made.
- g. Know how to properly use the shop filling system.
- h. How to use shop manuals when seeking information.
- i. Read catalogues and advertisements.
- j. Use dictionary.
- k. Take notes from reference sources.
- l. Describe desirable and undesirable working conditions.
- m. Write letters to industry for information or supplies.

## 2. Spelling

- a. Should be able to spell common tools and supplies such as: hammer, plane, screwdriver, nail, screw, mallet, brad, saw, glue, shellac, varnish, paint, putty, enamels, clamp, chisels, etc.
- b. Tests given orally, answers to be written by pupils in order to check spelling periodically.

## 3. Arithmetic

- a. Figure dimensions (addition, subtraction, multiplication and division).
- b. Figure board feet.
- c. Figure the cost of the article being made.
- d. Figure simple bill of materials.
- e. Use board and linear measure.
- f. Use measures in mixing paint.
- g. How to properly read a rule to  $1/16$  of an inch.
- h. Figure material allowed for rough cut.
- i. Total cost of tools on each bench.
- j. Know how to measure simple angles.





#### 4. Science

- a. Study the effects of moisture in wood.
- b. Study the effects of stain.
- c. Understand the cause of knots and checks and other defects.
- d. What is meant by evaporation?
- e. What causes putty, wax, paints, etc. to dry?
- f. The preservatory qualities of paint and other coverings.
- g. Why we have open and closed grained woods and the ways to identify each.
- h. Understand the combustion of oil in rags and waste.
- i. The actions of both hot and cold glue.
- j. How to recognize strains caused by bending woods.
- k. What is meant seasoning wood?
- l. How to identify some of the common trees.
- m. Study why various finishes are used, and the other reasons why some finishes dry faster than others.

#### 5. Hygiene

- a. Report to me all cuts, scratches, and slivers.
- b. Have all foreign particles removed from eyes immediately.
- c. Understand the need of cleaning the shop equipment, hands and face to avoid troubles from dust and dirt.
- d. Show them the results from burns, blisters, bruises that have not been properly treated.
- e. Avoid bringing sores, cuts and scratches in contact with liquids and dirty covered solids.





- f. Why they should avoid exposure to drafts.
- g. Show them why they should breathe through their nose to avoid inhaling excessive dust.
- h. Why they should have the proper lighting when working.
- i. Work in correct and comfortable position.
- j. Why they should always use goggles when using the grinder.
- k. Why they should keep their fingers from their eyes and mouth.
- l. Never put tools, pencils, screws, nails or brads in the mouth.
- m. Apply first aid in simple cuts.
- n. Never lift anything too heavy.
- o. Why they should always have good ventilation.

## 6. Safety

- a. Why they should keep their fingers and hands away from moving parts of power machines.
- b. The proper way to use a knife or other sharp edge tool; always cut away from you.
- c. Tools should be placed securely so they cannot fall.
- d. Avoid danger of falling stock.
- e. Use hot glue and the container with care.
- f. Why they should never use full, defective and unfamiliar tools.
- g. Remove all nails, brads, and screws from wood before putting it back on the wood rack or throwing it in the scrap box.
- h. Never throw nails in the tin or waste.
- i. Throw all wood scrap in the scrap box, never





throw it on the floor so they can become stumbling blocks.

- j. When hammering nails set them correctly preventing them from flying.
- k. Watch out for hands and fingers when hammering.
- l. Report to me all recognized dangers you see in the shop.
- m. Follow shop rules and regulations at all times while working in the shop period.

7. Drawing

- a. Find dimensions and position of parts in sketches and views.
- b. Make tracings, sketches and drawings for their own use.
- c. Repair damaged drawings.
- d. Identify different single views.
- e. Identify elements of construction in drawings.
- f. Make and use drawings details.

8. Industrial Information - Materials, Supplies, Equipment, etc.

Materials

- a. The characteristics of pine, white wood, gum wood, and fur.
- b. The favorable and unfavorable qualities in the working and using of these woods.
- c. The sources of supply, the growth, lumbering, milling, drying, and transportation to market of these woods.
- d. Who sells these woods, sizes, grades, price of common sales unit.
- e. Plane oak, ash, white wood, location of forest regions from which the largest amounts are marketed.



There is no other way to get the same results.

1. The first step is to get the same results.

2. The second step is to get the same results.

3. The third step is to get the same results.

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13. The thirteenth step is to get the same results.

14. The fourteenth step is to get the same results.

15. The fifteenth step is to get the same results.

16. The sixteenth step is to get the same results.

- f. The favorable qualities, strength, workableness and beauty.
- g. The unfavorable qualities that cause shrinking.
- h. The imitations and substitutes, their comparative advantages and disadvantages.
- i. Quartered oak, walnut, mahogany, native and foreign sources of supply.
- j. Historic and modern uses in fine furniture.
- k. Forestry; Historic development.
- l. Story of varnish, shellac, paints, glue, putty, linseed oil, etc.

### Supplies

- a. Characteristics of common types of nails and screws.
- b. The advantages of working with each kind.
- c. Their holding qualities compared.
- d. The proper way to order supplies.
- e. Why it is important to know the grade names when ordering or working with supplies.
- f. Why it is important to know sizes of the articles that are being ordered.
- g. How to take simple inventory of supplies and how to order the ones that are needed.

### Equipment

- a. History of the hammer.
- b. History of the hand plane and the other common tools.
- c. Showing the similar cutting qualities of sandpaper, file, and the saw.
- d. Action parts in the hand drill and other common mechanical tools.





- e. How saws cut; when and why you use each.
- f. The story of the manufacture of the common tools.
- g. The story of the paint brush, file, the auger bit, emery wheel and the oil stone.
- h. Market Analysis; Who sells what they want, sizes, grades, and the prices of common sales units.

## 9. Consumer Training

### Realization of the Need

- a. Know what people will use the article.
- b. The proposed location of the article.
- c. Benefits to be derived from its use.

### Selection of the Article

- a. Name the parts of the article.
- b. Describe the use of one or more important parts.
- c. Compare these parts in two or three articles in regard to their sizes and shapes being well suited for the use and the appearance of the article.

### Purchasing the Article

- a. The disadvantages of living without the proposed article.
- b. The usefulness of this article compared with their present need for other articles.
- c. The article that is suited to the user's standards of living (costs, durability, upkeep).
- d. The article in keeping with the uses and the appearances of the surrounding articles.

### Care of the Article

- a. Abuses, neglect. Give examples of satisfactory



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3. The third of the two main points.
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5. The fifth of the two main points.
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9. The ninth of the two main points.
10. The tenth of the two main points.

### Conclusion

#### Summary of the main points

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#### Final remarks

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#### End of the report

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10. The tenth of the two main points.

care taken.

- b. Know the signs that indicate the article's need for repaid.
- c. Possibilities of home and commercial repairs.

#### 10. Testing Activity

- a. Give oral and written examinations on the common hand tools and materials and supplies.  
The written tests to be the True and False, or Completion Type.

##### Examples:

A mallet is used to set a nail T or F

A hand plane is used to make a piece of wood smooth, straight and flat. T or F

The tooth of the \_\_\_\_\_ saw is chisel shaped. (Ans. Rip)

A \_\_\_\_\_ is used to draw a nail or brad from a piece of wood. (Ans. Hammer)

While working on the table I will ask the boys to go to the tool board and get me a particular tool, in this way I will test their knowledge of the tools and give them a drill in associating the correct name with the particular tool.

- b. Checking the finished table

##### Testing For:

- 1. Measurements and correct sizes of the particular parts.
- 2. Joints whether they were made sloppy or accurately.



1947

1. The first of the three is the...

2. The second of the three is the...

### 3. The third of the three is the...

4. The first of the three is the...

### 4. The first of the three is the...

5. The first of the three is the...

6. The first of the three is the...

7. The first of the three is the...

8. The first of the three is the...

(Ann. 1947)

9. The first of the three is the...

10. The first of the three is the...

11. The first of the three is the...

12. The first of the three is the...

13. The first of the three is the...

14. The first of the three is the...

### 15. The first of the three is the...

16. The first of the three is the...

17. The first of the three is the...

18. The first of the three is the...

3. If proper wood fasteners were used.
4. Was the wood rough or smooth in all the parts of the table?
5. Was the stain applied evenly and correctly?
6. Was the varnish or shellac applied correctly? Were there any laps in the varnish or shellac?
7. Was the final finish smooth and glass-like, or was it rough, with many small particles imbedded in it?
8. Is the table level?
9. How were mistakes corrected?

### Handwork

The teacher is ready for handwork when the pupils have their plans and the room is organized to facilitate construction work. At the end of this construction period the teacher should feel free to help the pupils evaluate their experiences. Many short contacts with all the pupils are more effective than long conferences with each individual.

The length and the number of the construction periods will depend on the amount of handwork that is essential to the success of the activity unit. The Bulletin of the Department of Education on Special Classes states as one of its regulations as follows: "At least two hours per day of some form of handwork shall be given to all pupils." With regulation in mind I think it would be a good practice to use a double class period for construction work, because the arrangement of the room and the cleaning up after work take





so much time that one single period will scarcely prove long enough for the successful accomplishment of the work.

The teacher, must remember, that the construction work is only one part of the content and experiences of an activity unit. This construction should not be permitted to monopolize the entire instruction time nor crowd out other desirable activities. The wise balancing of all the activities of the unit in one of the teacher's most important tasks.

I find this unit system an excellent aid in checking my teaching and evaluating the work of each student.



to find the fact that the single point of view is not only given but

is also for the necessary adaptation of the work.

The author, most certainly, does not consider it

to find the fact of the existence of a system of an order

of the fact. This is not only the result of the system but

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CHAPTER III

Specific Vocational Needs for Ungraded Children

Introduction

The child's vocational needs are those which are necessary for the child to develop his potentialities and to become a self-sufficient member of society. The child's vocational needs are those which are necessary for the child to develop his potentialities and to become a self-sufficient member of society.

CHAPTER IV

SPECIFIC VOCATIONAL NEEDS FOR UNGRADED CHILDREN

The child's vocational needs are those which are necessary for the child to develop his potentialities and to become a self-sufficient member of society. The child's vocational needs are those which are necessary for the child to develop his potentialities and to become a self-sufficient member of society.



CHAPTER IV  
SIXTH VOCATIONAL FIELD FOR WOMEN

## CHAPTER IV

### Specific Vocational Needs For Ungraded Children

#### Materials

Know simple facts about forestry and lumbering.

Why some woods are harder than others.

How wood is prepared for furniture.

Know what is meant by seasoning wood.

What particular woods are used for furniture and others for construction work and the reasons why.

To be able to tell the age of a tree.

To know what grain is.

To know what the term warp means.

What causes a board to warp.

Know the kinds of wood used in the shop and why those particular kinds.

Identify the different kinds of screws.

How to determine the size of a screw.

When to use a screw eye.

When to use a screw hook.

The proper way to fasten stock with screws.

Identify the different kinds of nails.

When to use a box nail.

When to use a common nail.

When to use a finish nail.



CHAPTER IV

THEORY OF THE EARTH'S CRUST

Introduction

The earth's crust is the uppermost layer of the earth, which is composed of various rocks and minerals. It is the part of the earth that we live on, and it is the part that we see. The crust is made up of different layers, and it is constantly changing. The rocks in the crust are formed from molten material, and they are cooled and solidified. The crust is the part of the earth that is closest to the surface, and it is the part that we can see and touch. It is the part of the earth that is most important to us, because it is the part that we live on. The crust is made up of different layers, and it is constantly changing. The rocks in the crust are formed from molten material, and they are cooled and solidified. The crust is the part of the earth that is closest to the surface, and it is the part that we can see and touch. It is the part of the earth that is most important to us, because it is the part that we live on.

When to use a brad.

Know the difference between a nail and a brad.

When to use casing nail.

How to determine the different sizes of nails and brads.

The proper way to fasten stock with nails.

Know what a corrugated fastener is and when it should be used.

The proper way to set a corrugated fastener.

Know what a rung fastener is and when it should be used.

The proper way to set a rung fastener.

The proper way to draw nails.

Know what glue is and how it is properly used.

Know the different kinds of glue.

What a wood stain is used for.

Know the different kinds of stain.

Know when to use a water stain.

Know when to use an oil stain.

Know when to use a spirit stain.

To know why water stains fade less than other types of stains.

Know that water stains raise the grain of wood while oil stain does not.

The proper way to apply stain to wood with a brush.

The proper way to apply stain to wood with a cloth.

To apply stain very quickly and evenly.

Always stain the top of the project last.

Know that water stain penetrates wood better than oil stain.





How to use paint properly.

How to make and mix paint.

What is the main difference between paint and enamel.

When to use enamel instead of paint.

What shellac is and when it is used.

Know that enamels will produce a harder, smoother, and higher gloss surface than paint.

What linseed oil is used for.

That linseed oil comes from flaxseed.

The process used in making linseed oil.

What turpentine is used for.

How turpentine is manufactured.

What the purpose is for having a coat of wax on a finished surface.

What a wood filler is used for.

The proper method in using a wood filler.

What shellac is and how it is properly used.

Why shellac and water should never come in contact.

The different kinds of shellac and when each is used.

Why shellac is used in the electrical industry.

Why it is more difficult to prevent end-laps when applying shellac than when applying varnish.

What an end-lap is, and how to prevent it.

The reason why shellac dries so fast.

Why alcohol is used to thin shellac and not turpentine.

What Japan drier is and how it is properly used.

What varnish is and how to properly apply it to a project.





What a lacquer is and how it is properly used on a project.

The reason why a lacquer finish is so hard to touch up.

How sandpaper is made.

What sandpaper is used for.

The different grades of sandpaper and when each grade is properly used.

What emery cloth is and how it is properly used.

What the main differences are between emery cloth and sandpaper.

What is steel-wool and when it is properly used.

Know the different sizes of steel-wool and when each size is properly used.

Know what a plastic wood is and when it is used.

Know what putty is.

How putty is used.

Know the proper way to soften putty.

Know what pumice is and how it is properly used.

How pumice is graded.

Where pumice comes from.

What dowel is used for.

How the dowel is made.

What the sizes of dowels are and how each are properly used.

Know what masonite is and when it is used.

Know what ply-wood is.

Know the best way to cut ply-wood to size.

Why ply-wood is stronger than ordinary wood.



1. The first step in the process is to identify the problem.

2. The second step is to define the objectives of the study.

3. The third step is to design the study.

4. The fourth step is to collect data.

5. The fifth step is to analyze the data.

6. The sixth step is to interpret the results.

7. The seventh step is to draw conclusions.

8. The eighth step is to communicate the findings.

9. The ninth step is to evaluate the study.

10. The tenth step is to report the results.

11. The eleventh step is to discuss the implications.

12. The twelfth step is to recommend further research.

13. The thirteenth step is to conclude the study.

14. The fourteenth step is to prepare the final report.

15. The fifteenth step is to submit the report.

16. The sixteenth step is to defend the study.

17. The seventeenth step is to receive feedback.

18. The eighteenth step is to revise the report.

19. The nineteenth step is to resubmit the report.

20. The twentieth step is to accept the final report.

21. The twenty-first step is to publish the results.

22. The twenty-second step is to disseminate the findings.

23. The twenty-third step is to evaluate the impact.

24. The twenty-fourth step is to recommend changes.

25. The twenty-fifth step is to implement the changes.

26. The twenty-sixth step is to monitor the progress.

27. The twenty-seventh step is to report on the progress.

28. The twenty-eighth step is to evaluate the outcomes.

29. The twenty-ninth step is to disseminate the results.

30. The thirtieth step is to conclude the project.

### Tools

Know the proper way to hold the hammer.

Know how to properly use a hammer.

Know the correct way to draw a nail or brad with the claw of the hammer.

Know how to keep the hammer shape and clean and know the reason why.

Know how to pick the correct size hammer for each job.

Know the proper way to hold the screw-driver.

Know how to properly use the screw-driver.

Know the sizes of the screw-driver.

Know how to properly sharpen the screw-driver.

Know how to read a ruler.

Know the proper way to measure.

Know what a try-square is used for.

Know how to properly use a try-square.

Know what a framing square is used for.

Know how to properly use a framing square.

Know what a T-vebel is used for and how to use it correctly.

Know what the marking is used for.

Know how to properly hold the marking gauge.

Know the proper way to sharpen the marking gauge.

Know how to use the marking gauge correctly.

Know what dividers are and when they are used.

Know the proper way to hold the dividers.

Know how to use the dividers correctly.

Know what the trammel points are and when they are used.





Know why trammel points are used instead of dividers.  
Know the proper way to sharpen the points of the trammel.  
Know the proper way to hold a hand saw.  
Know when to use a rip-saw.  
Know when to use a cross-cut-saw.  
Know when to use a back-saw.  
Know when to use a dovetail-saw.  
Know when to use a mitre-saw.  
Know when to use a turning-saw.  
Know when to use a coping-saw.  
Know when to use a key-hole-saw.  
Know when to use a compass-saw.  
How to identify each saw.  
The proper way to sharpen a saw.  
What is meant by "setting" a saw.  
Know why a saw is kept oiled.  
What a hand plane is used for.  
Know when to use a Jack plane.  
The proper way to hold the Jack plane.  
The correct way to use a Jack plane.  
When to use a smoothing plane.  
The proper way to hold the smoothing plane.  
The correct way to use a smoothing plane.  
When to use a fore plane.  
When to use a jointer plane.  
When to use a block plane.





When to use a bullnose plane.

When to use a rabbet plane.

When to use a router plane.

When to use a universal plane.

When to use a circular plane.

When to use a spokeshave.

Know the proper way to hold each one of these planes.

Know the correct way to use each one of these planes.

Know the proper way to sharpen a plane iron.

To know the principal parts of the common hand planes.

Know how to properly use the draw knife.

Know how to hold the draw knife.

When to use the draw knife.

The proper way to sharpen the draw knife.

Know how to properly hold a bit brace.

Know the proper way to use a bit brace.

Know when to use an auger bit.

When to use a twist bit.

When to use a twist drill.

Know when to use an iron drill.

Know when to use a round shank iron drill.

Know when to use a gimlet.

When to use a forstner bit.

When to use an expansive bit.

When to use a countersink.

When to use a dowel bit.





Know how to identify each one of these bits and drills.

Know the proper way to sharpen each one of these drills and bits.

Know what a bit stop is used for.

Know how auger bits are sized.

Know how each one of these bits and drills are sized.

Know the proper way to hold a hand drill.

The correct way to use a hand drill.

Know what a scratch awl is used for.

Know how to sharpen the scratch awl.

Know how to properly hold a wood chisel.

The proper way to sharpen a wood chisel.

Know the difference between a tang and a socket chisel.

Know how to use a wood chisel properly.

Know the sizes of the wood chisels.

Know what a gouge is used for.

What the inside bevel gouge is used for.

Know what the outside bevel gouge is used for.

Know what a veining tool is used for.

Know how to properly use a veining tool.

Know the proper way to sharpen a veining tool.

Know how to identify the following holding tools.

When to use a vise.

Know how to properly use a vise.

When to use a hand-screw clamp.

Know how to properly use a hand-screw clamp.





When to use a carriage clamp.

Know how to properly use a carriage clamp.

When to use a racket brace.

Know how to properly use a racket brace.

When to use a corner brace.

Know how to properly use a corner brace.

When to use a saw-horse.

When to use a bench hook.

Know how to properly use a bench hook.

When to use a mitre box.

Know how to properly use a mitre box.

Know how to set correct angles on a mitre box.

Know when to use an automatic drill.

How to properly use an automatic drill.

Know how to identify the following scraping tools.

Know when to use a hand scraper.

How to properly use a hand scraper.

When to use a cabinet scraper.

Know how to properly use a cabinet scraper.

Know when to use a scraper plane.

How to properly use a scraper plane.

Know when to use a hoe-type scraper.

How to properly use a hoe-type scraper.

When to use a swan-neck scraper.

Know how to use a swan-neck scraper.



Each of the 1200 - 1300

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Know the correct way to sharpen each one of the above scrapers.

Know what a wood file is used for.

Know the proper way to clean a file.

When to use a hand file.

When to use a flat file.

When to use a half-round file.

When to use a triangle file.

Know the sizes of files.

Know what a wood rasp is used for.

Know how to properly use a wood rasp.

Know how to clean a wood rasp.

Know the sizes of wood rasps.

Know what a file card is used for.

How to use a Stanley saw set.

How to use a wooden mallet properly.

Know when to use a wooden mallet.

When to use a hack saw.

How to properly use a hack saw.

Know the proper way to change a hack saw blade.

How to properly use a soldering iron.

The proper way to tin a copper.

Know the sizes of soldering irons.

Know how to properly use a glass cutter.

Know how to sharpen a glass cutter.

Know the proper way to use a Sloyd knife.





Know how to sharpen a Sloyd knife.

When to use a Sloyd knife.

Know the proper way to use a nail set.

Know how to sharpen a nail set.

Know how to properly use a pair of pliers.

When to use a pair of pliers.

Know the different kinds of pliers and when each one should be properly used.

Know how to properly use a pair of scissors.

Know how to properly sharpen a pair of scissors.

When to use a pair of snips.

How to properly use a pair of snips.

Know the proper way to sharpen a pair of snips.

Know the sizes of snips.

Know how to properly use a monkey wrench.

Know when to properly use a Stillson wrench.

Know the main difference between a monkey wrench and a Stillson wrench.

Know when to use a monkey wrench.

Know when to use a Stillson wrench.

When to use a power jig saw.

How to properly operate a power jig saw.

How to properly oil a power jig saw.

Know why a power jig saw is always kept well oiled.

When to use a hand grinder.

How to properly use a hand grinder.

Know why you should always wear safety glasses when using a grinder of anykind.





### Operations

- How to make a working drawing.
- How to square stock to dimensions.
- How to plane chamfers and bevels.
- How to lay out and cut curves.
- How to smooth curved surfaces.
- How to bore holes with wood bits.
- How to fasten stock with screws.
- How to fasten stock with brads or nails.
- How the cross lap joint is made.
- How to make a butt joint.
- How to make the dado and rabbet joints.
- How to make a mortise and tenon joint.
- How to make a doweled joint.
- How to make an edge joint.
- How to clamp stock for assembling.
- How to install hinges.
- How to prepare wood surfaces for finishing.
- How stains are properly applied to wood.
- How to apply a paste filler.
- How to properly apply shellac.
- How to properly apply varnish.
- How to properly apply lacquer.
- How to refinish furniture.
- How to do simple upholstering.
- How to set and sharpen the hand saws.





- How to sandpaper a flat surface.
- How to sandpaper a curved surface.
- How to putty a window.
- How to cut curves with a turning saw.
- How to cut curves with a coping saw.
- How to cut curves with a compass saw.
- How to smooth curves with a wood file.
- How to smooth curves with a spokeshave.
- How to smooth curves with a circular plane.
- How to smooth curves with sandpaper.
- How to read a working drawing.
- How to cut sheet metal with a pair of shears.
- How to bend sheet metal.
- How to make a solder joint.
- How to make a bill of material.
- How to plane the procedure for doing a job.
- How to oil tools to keep them from rusting.
- How to straighten a warped door.
- How to insert a lock in a door or a drawer.
- How to properly wire a lamp.
- How to properly cut a circle on a power jig saw.



For the purpose of this study.

The results of the study are as follows.

The first finding is that

the data collected from the study

was in line with the hypothesis.

The second finding is that

the data collected from the study

was in line with the hypothesis.

The third finding is that

the data collected from the study

was in line with the hypothesis.

The fourth finding is that

the data collected from the study

was in line with the hypothesis.

The fifth finding is that

the data collected from the study

was in line with the hypothesis.

The sixth finding is that

the data collected from the study

was in line with the hypothesis.

The seventh finding is that





CHAPTER V

THE NECESSARY FOR WORKING IN A SPECIAL CASE

## CHAPTER V

### Tools Necessary for Woodworking in a Special Class

#### I. Hammers

10 Claw Hammers 12 oz. Bellface  
 3 Claw Hammers 7 oz. Bellface  
 2 Tack Hammers

#### II. 6 Mallets 3" x 5" Hickory

#### III. Saws

3 Crosscut Saws 26" 8 pt.  
 3 Rip Saws 22" 7 pt.  
 2 Back Saws 10" 14 pt.  
 12 Coping Saw Frames  
 1 Compass Saw Handle  
 1 Hack Saw Adjustable Frame, Pistol Grip

#### Saw Blades

10 doz. Coping Saw Blades 6" course  
 10 doz. Coping Saw Blades 6" fine  
 6 Hack Saw Blades 8" 24 pt.  
 3 Compass Saw Blades (3 different sizes)

#### IV. Planes

3 Jack Planes 14" (2" cutter)  
 3 Smooth Planes (2" cutter)  
 3 Block Planes 6"  
 1 Rabbit Plane (1" cutter)

#### V. Marking, Measuring and Squaring Tools

1 Framing Square 24" x 16"  
 1 Combination Square 12"  
 3 Try-Squares 6"  
 6 Marking Gauges (Screw and Wire)  
 12 Rules, 12" Boxwood  
 3 Rules, 24" folding  
 3 Bit Gauges



APPENDIX V

Notes on the collection of the specimens

I. General

1. The specimens were collected in the following manner:  
2. The specimens were collected in the following manner:  
3. The specimens were collected in the following manner:

4. The specimens were collected in the following manner:

II. Details

1. The specimens were collected in the following manner:  
2. The specimens were collected in the following manner:  
3. The specimens were collected in the following manner:  
4. The specimens were collected in the following manner:

5. The specimens were collected in the following manner:

III. Notes

1. The specimens were collected in the following manner:  
2. The specimens were collected in the following manner:  
3. The specimens were collected in the following manner:  
4. The specimens were collected in the following manner:

IV. Summary

1. The specimens were collected in the following manner:  
2. The specimens were collected in the following manner:  
3. The specimens were collected in the following manner:  
4. The specimens were collected in the following manner:

5. The specimens were collected in the following manner:

6. The specimens were collected in the following manner:  
7. The specimens were collected in the following manner:

8. The specimens were collected in the following manner:

9. The specimens were collected in the following manner:

10. The specimens were collected in the following manner:

11. The specimens were collected in the following manner:

## VI. Pliers

- 1 Combination Pliers 6"
- 1 Flat Nose Pliers 5"
- 1 Side Cutting Pliers
- 1 Roundnose Pliers
- 1 Carpenter Pincers

## VII. 2 Hand Drills

## VIII. 2 Bit Braces 10"

## IX. Wood Bits and Drills

- 1 Wood Bit of each of the following sizes:  
3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 9/16",  
5/8", 11/16", 3/4", 13/16", 7/8", 15/16", 1".
- 1 Expansive Bit 7/8" to 3" Clark Pattern, Pexto
- 1 Wood Drill of each of the following sizes:  
3/32", 4/32", 5/32", 6/32", 7/32", 8/32".
- 2 Countersinks 5/8" Greenlee Rose Pattern

## X. Files

- 3 Cabinet 12"
- 3 Half Round 10"
- 2 Half Round 8"
- 1 Slimtaper 6"
- 3 Flat Bastard 10"
- 3 Mill 12"
- 2 Round Bastard 8"
- 1 Round Bastard 6"
- 3 Half Round Wood Rasp 12"

## XI. Pressure Tools

- 4 Wood Clamps 12"
- 2 C Clamps 6"
- 2 C Clamps 3"
- 2 Bar Clamps 3'
- 2 Bar Clamps 4'

## XII. Wood Chisels

- One each of the following sizes:  
1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 1".

XIII. Screwdrivers one of each of the following sizes;  
4", 6", 8", 10".





- XIX. 2 Nail Sets  
One  $2/32$ "  
One  $4/32$ "
- XV. 1 Sliding T-Bevel
- XVI. 6 Bench Hooks
- XVII. 1 Calipers 6"
- XVIII. 4 Counter Brushes
- XIX. 1 Combination Oil Stone 8" x 2" x 1"
- XX. 1 Oil Can
- XXI. 3 Sloyd Knives  $31/2$ "
- XXII. Paint Brushes  
2 each of the following sizes:  
 $1/2$ ", 1",  $1\ 1/2$ ", 2".
- XXIII. 6 Pencil Compasses
- XXIV. 1 Dividers 8" wing
- XXV. 1 File Card
- XXVII. 1 Glass Cutter
- XXVIII. 1 Putty Knife  $3\ 1/2$ " x  $2\ 1/2$ "
- XXIX. 2 Horses 30"
- XXX. 1 Mitre Box
- XXXI. 1 Tin Snips
- XXXII. 3 Scissors 6" M.T.
- XXXIII. 3 Spokeshaves
- XXXIV. 2 Monkey Wrenches, one 8" and 12"
- XXXV. 2 Glue Brushes, one  $1/2$ ", and  $3/4$ "
- XXXVI. 1 Hand Grinder
- XXXVII. 2 Floor Brushes



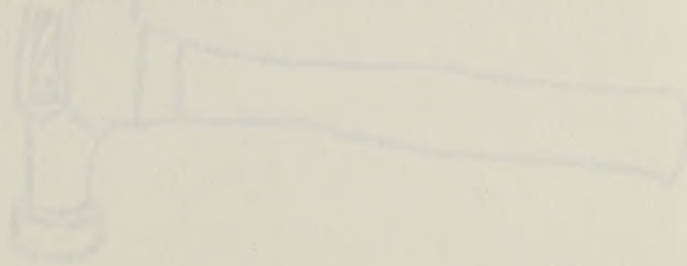


XXXVIII. 1 First Aid Cabinet and Supplies ( Shop Size)

XXXIX. Vises - Try to have a vise in good working order for each work bench.

XXXX. Work Benches - A work bench for each boy if possible but not more than two boys on a single bench.

XXXXI. 18 Pencils - (Kindergarten)



The vise shown is the type of bench vise generally used by carpenters and woodworkers. The body of the vise is cast in one piece and is shaped so that it can be used for holding work. The face of the vise is slightly convex, or bell-shaped, so that it will not make a circular mark on the surface of the work after striking the work with the point of the tool. It is important to keep the face of the bench vise and free from grease, dirt, and oil, so that it will not glaze off the work of a tool and bend it. The size of the vise is indicated by the weight of the body in pounds and ounces.

Rules for correct cutting and grinding with a bench vise.

1. Select the kind and size of work held in the vise.

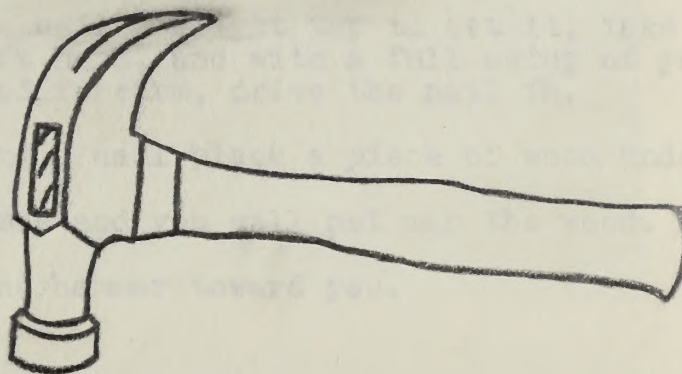


1. The first part of the report is devoted to a description of the work done during the year.

2. The second part of the report is devoted to a description of the work done during the year.

3. The third part of the report is devoted to a description of the work done during the year.

## THE CLAW HAMMER



The claw hammer is the type of hammer generally used by carpenters and woodworkers. The peen of this hammer is bent and shaped so that it can be used for pulling nails. The face of this hammer is slightly convex, or bell-faced, so that it will not make a circular mark on the surface of the wood after striking the last blow on the head of the nail. It is important to keep the face of the hammer clean and free from grease, glue or dirt, so that it will not glance off the head of a nail and bend it. The size of the hammer is indicated by the weight of the head in pounds and ounces.

Rules for correct driving and drawing with a Claw Hammer:

1. Select the kind and size of nail best suited to the job.



## THE CLAW HAMMER



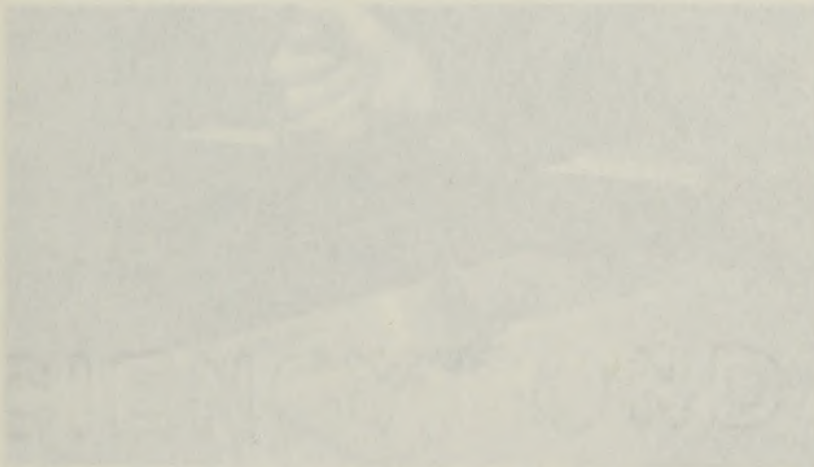
The claw hammer is the type of hammer generally used by carpenters and woodworkers. The head of this hammer is bent and shaped so that it can be used for pulling nails. The face of this hammer is slightly convex, or bell-faced, so that it will not make a circular mark on the surface of the wood after striking the last blow on the head of the nail. It is important to keep the face of the hammer clean and free from grease, glue or dirt, so that it will not glance off the head of a nail and bend it. The size of the hammer is indicated by the weight of the head in pounds and ounces.

Rules for correct driving and drawing with a Claw Hammer:

1. Select the kind and size of nail best suited to the job.

2. Hold nail between thumb and first finger of the left hand.
3. Grasp hammer near end of handle with right hand.
4. Give the nail a slight tap to set it, take away your left hand, and with a full swing of your wrist and forearm, drive the nail in.

In drawing a nail place a piece of wood under the claw of the hammer and you will not mar the wood. Draw the handle of the hammer toward you.





1. Hold nail between thumb and first finger of the left hand.

2. Grasp hammer near end of handle with right hand.

3. Give the nail a slight tap to set it, take away your left hand, and with a full swing of your wrist and forearm, drive the nail in.

In driving a nail place a piece of wood under the

claw of the hammer and you will not mar the wood. Push

the handle of the hammer toward you.



Grasp the hammer handle firmly near the end.



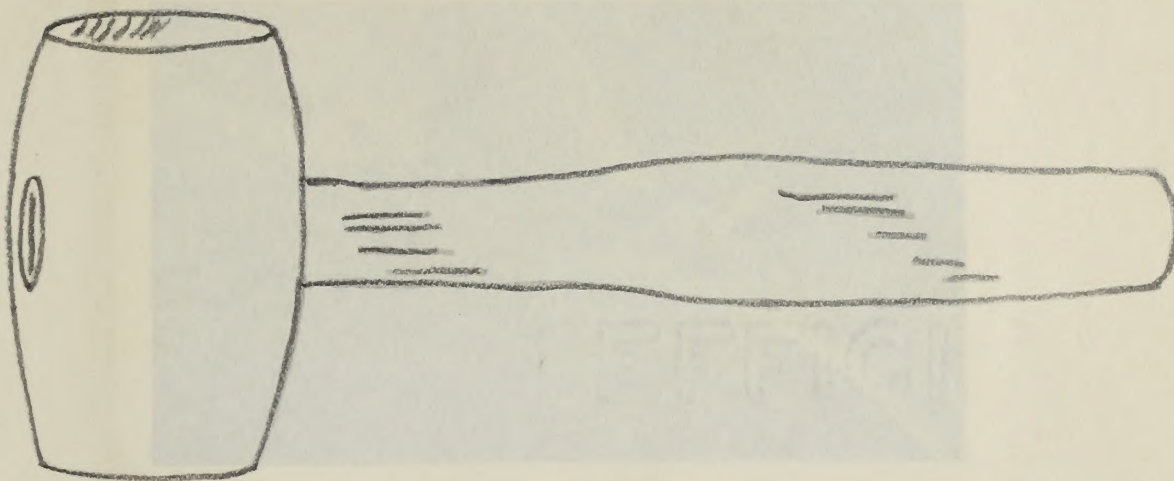
Pulling a nail with a claw hammer. Place a block under hammer head to protect the surface of the wood.



Grasp the hammer handle firmly near the end.

Position a nail with a claw hammer. Place a block under hammer head to protect the surface of the wood.

## THE WOODEN MALLET



The mallet or wooden hammer is used where metal hammers would make bruises or do other damage. As wood is more elastic than iron or steel, a mallet should always be used when driving on wood, such as striking chisels and gouges and for tapping parts of the project together before nailing or joining with screws.

Mallets are made of hard, tough wood usually maple or hickory.





Using the mallet to place tight fitting parts of a project.





Under the name of John Smith, Esq.





Using the mallet with a wood chisel.



Using the mallet to flatten soft metal.



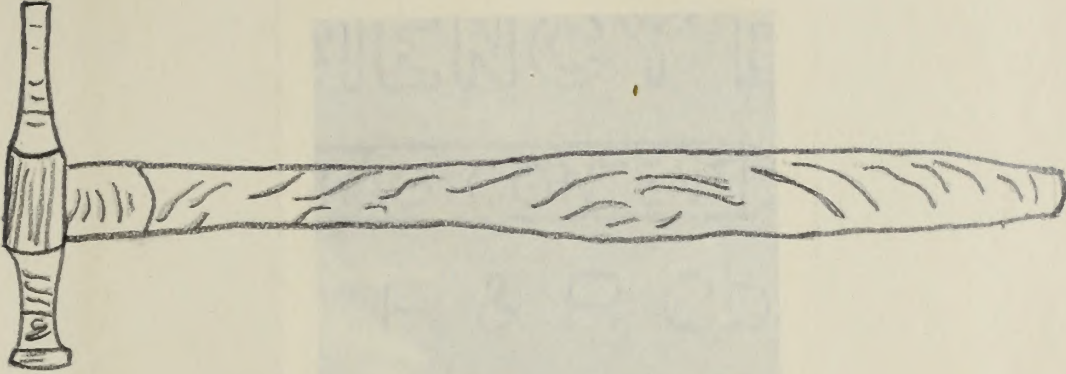


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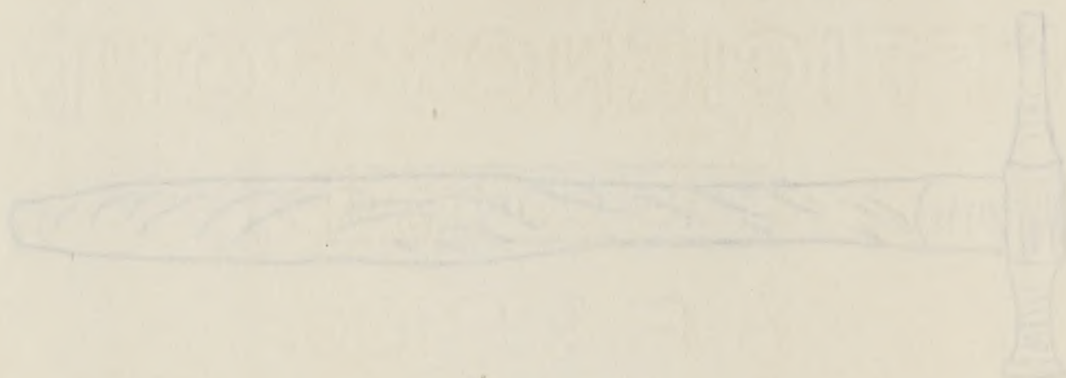
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## THE TACK HAMMER

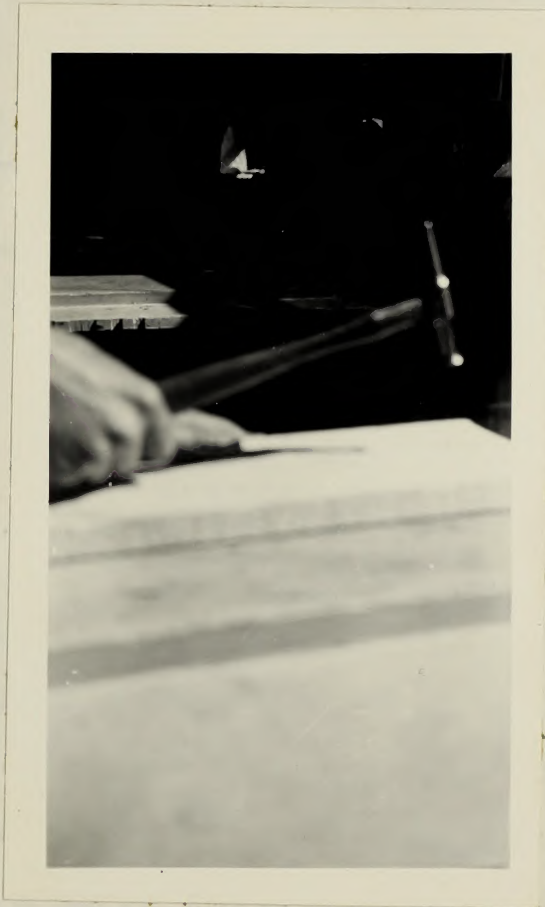


The tack hammer is used to drive tacks and small brads. It is a light hammer with a magnetic peen for holding small tacks or brads, that are too small to hold with the fingers, when setting.





The rock hammer is used to drive the nail into the wood. It is a light hammer with a wooden handle. The head is made of metal and is shaped like a hammer. The head is held in the hand and the handle is used to drive the nail into the wood. The head is held in the hand and the handle is used to drive the nail into the wood.



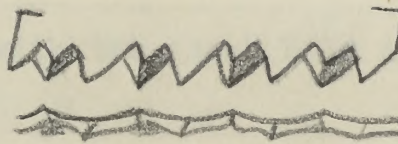
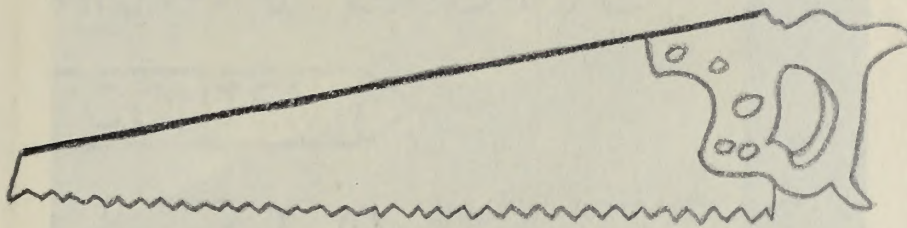
Setting a small brad with a tack hammer.





Received of the [illegible] a sum of [illegible] [illegible]

# THE CROSSCUT SAW

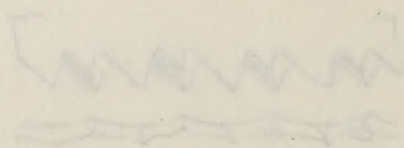
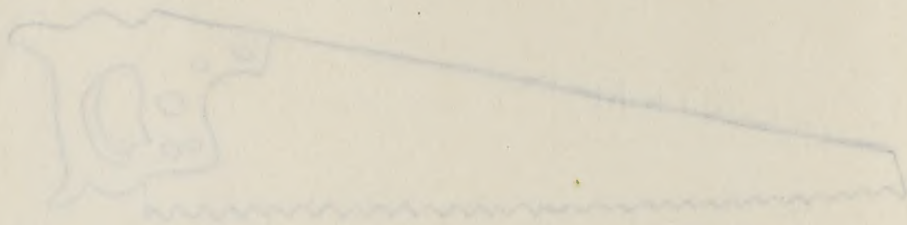


The crosscut saw is very necessary in working with wood. As the name tells you, it is used to cut across the grain of the wood. The teeth of the crosscut saw are filed so that they come to a point on the outside and end of the teeth just like a knife point. They cut like two rows of knife points and crumble out the wood between the cuts.

The size of the saw is indicated by the length in inches and the number of teeth per inch. The number of points to the inch varies from eight to twelve. Eight points to the inch is called an 8 point.

About 45 is the correct angle between the saw and the work for cross cut sawing.





The crosscut saw is very necessary in working with wood. As the name tells you, it is used to cut across the grain of the wood. The teeth of the crosscut saw are fitted so that they come to a point on the outside and end of the teeth form like a knife point. They cut like the point of knife points and curvilinear out the wood between the cuts.

The size of the saw is determined by the length of the handle and the number of teeth per inch. The number of points to the inch varies from 10 to 12. The saw is called a 10 point or 12 point.

About 45 is the correct angle between the saw and

the work the cross cut sawing.

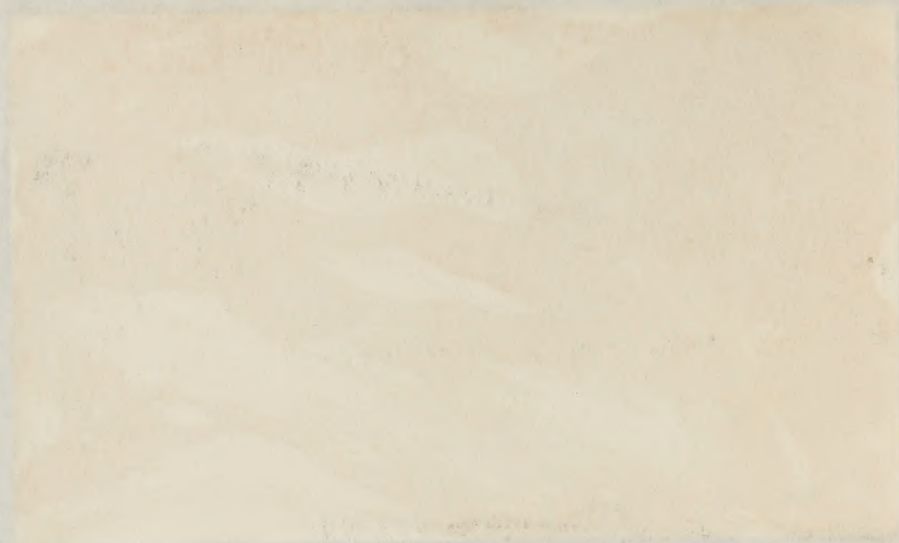


Crosscutting with the stock held in the bench vise.

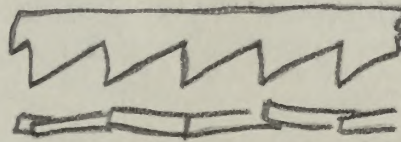
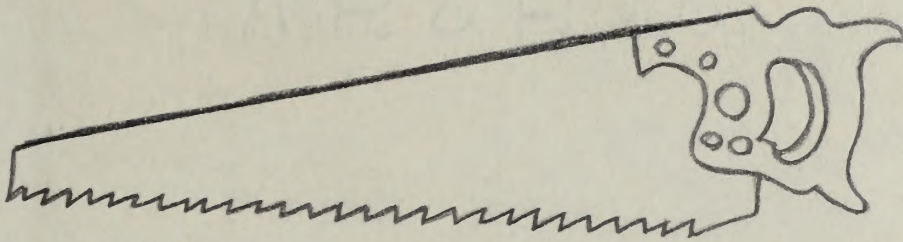


Crosscutting stock on a sawhorse.





## THE RIP SAW



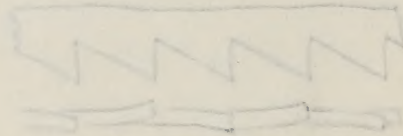
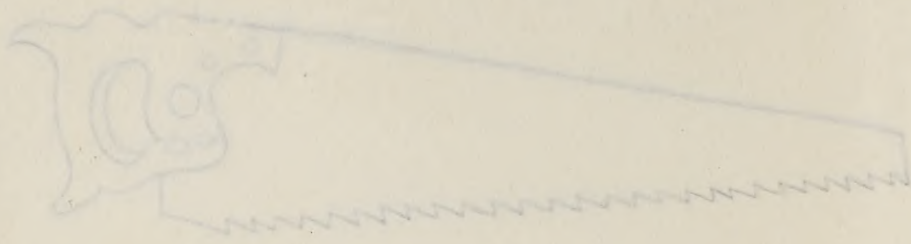
The rip saw is used to cut with the grain of the wood or lengthwise of the board. Blades of rip saws vary in length from 20 to 28 inches. They are always wider at the handle than at the end, in order to prevent them from bending or buckling when they are pushed through the wood. The size of the saw is indicated by the length in inches and the number of teeth per inch.

The teeth of a rip saw are shaped like chisel points, and their forward edges are at right angles to the length of the blade. They cut like a gang of chisels in a row.

About 60 is the correct angle between the saw and the work for rip sawing.

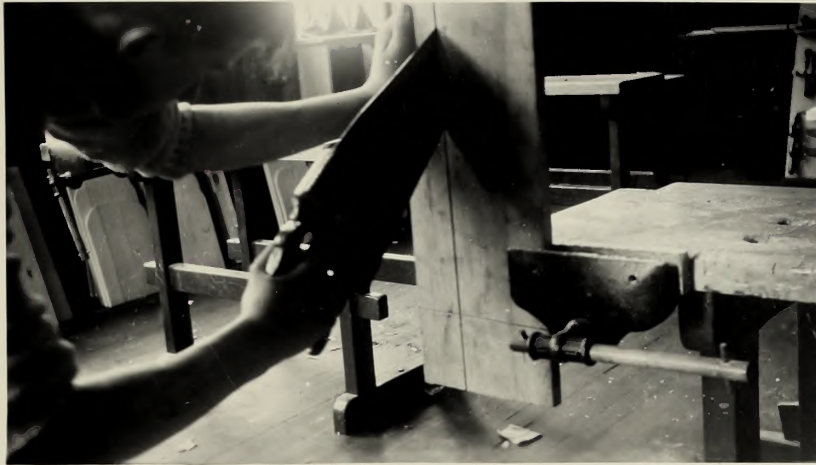


# THE RIP SAW



The rip saw is used to cut with the grain of the wood or lengthwise of the board. Blades of rip saws vary in length from 20 to 30 inches. They are always wider at the handle than at the end, in order to prevent them from bending or twisting when they are pushed through the wood. The size of the saw is indicated by the length in inches and the number of teeth per inch.

The teeth of a rip saw are shaped like tooth pointers and their forward edges are at right angles to the face of the blade. They cut like a pair of chisels in a row. About 60 is the correct angle between the saw and the work for rip sawing.



Ripping a board in a vise with a rip saw.



Ripping a board on a sawhorse with a rip saw.



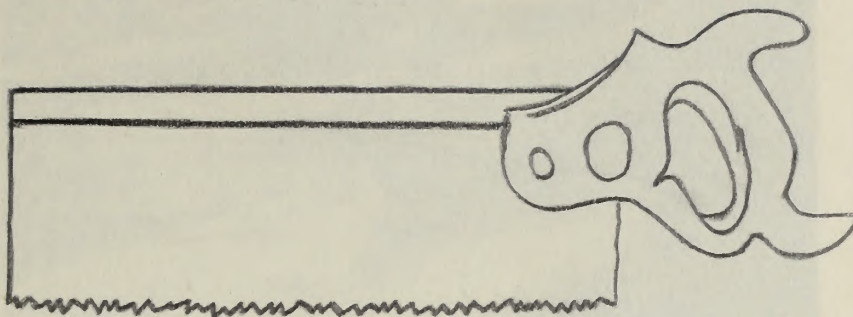


Shipping a board in a vine with a trip now.



Shipping a board on a separate with a trip now.

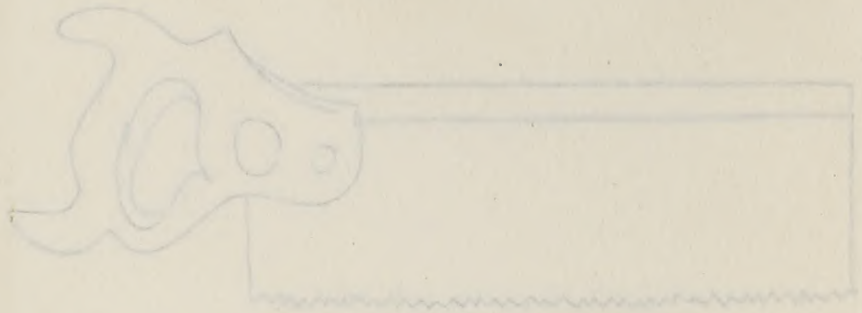
## THE BACK SAW



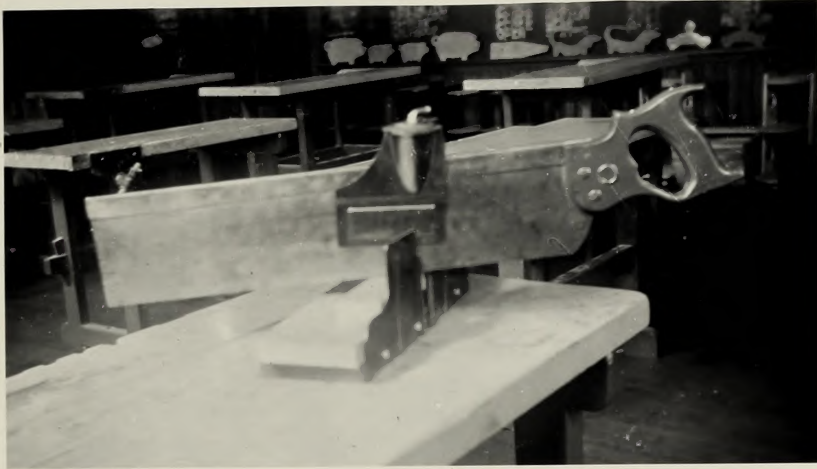
The back saw is a fine-toothed with a thin blade. It is made stronger by a heavy rib of steel along its back edge. The back saw comes in lengths varying from 10 to 24 inches. This saw is used for fine, accurate work, as in cutting joints. A good saw for children's use; makes a smooth cut suitable for finishing work.



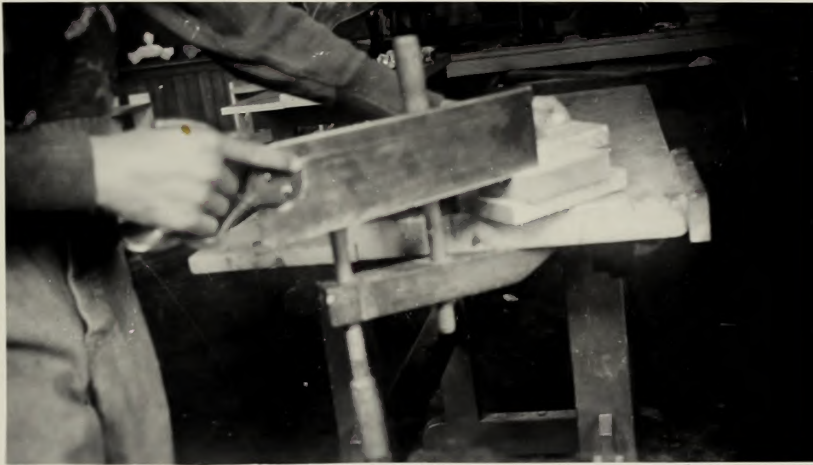
## THE JACK SAW



The back saw is a fine-toothed saw with a thin blade. It is made stronger by a heavy rib of steel along the back edge. The back saw comes in lengths varying from 12 to 24 inches. This saw is used for fine, accurate work as in setting joints. A good saw for millwork's use, makes a smooth cut suitable for finishing work.



The back saw in a miter box which makes a very accurate joint.

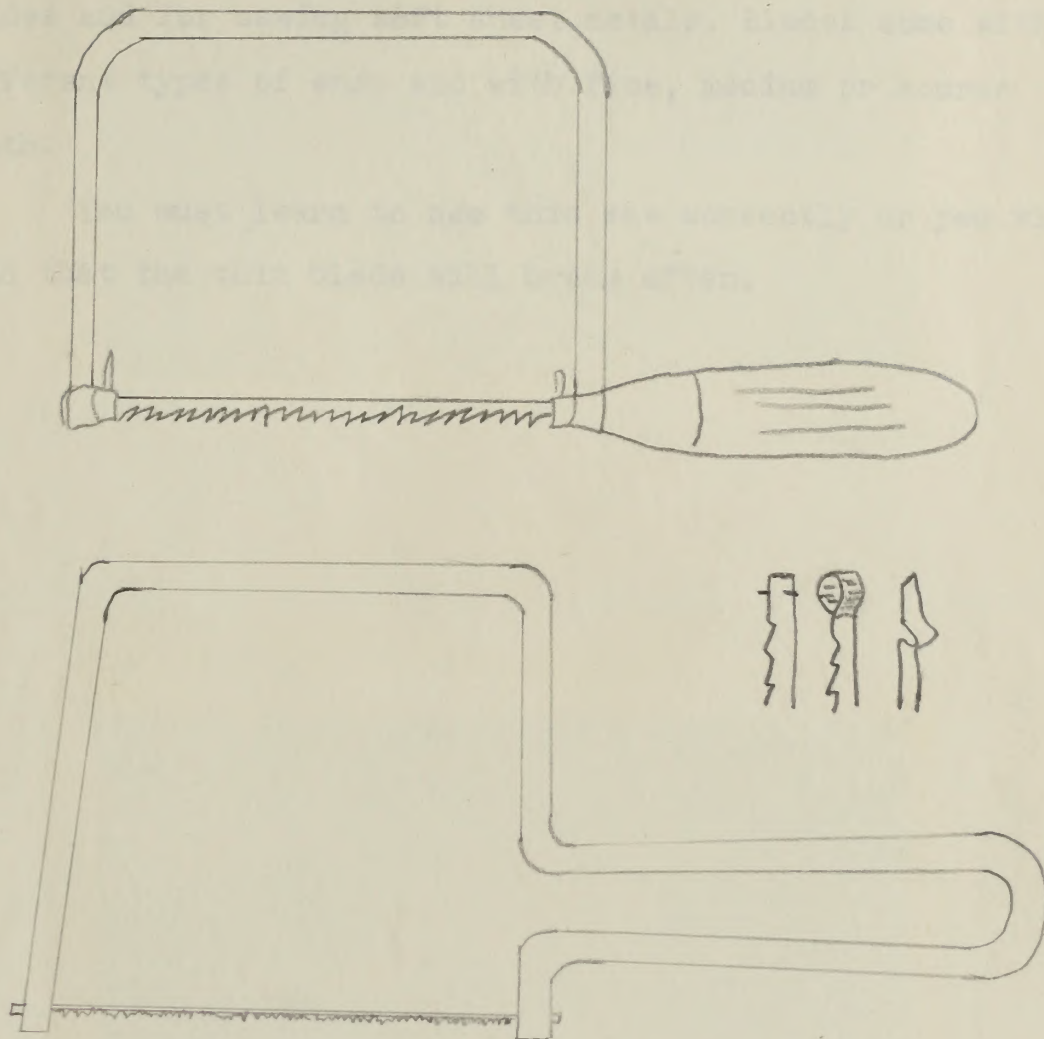


Block hand-screwed to piece guiding back saw





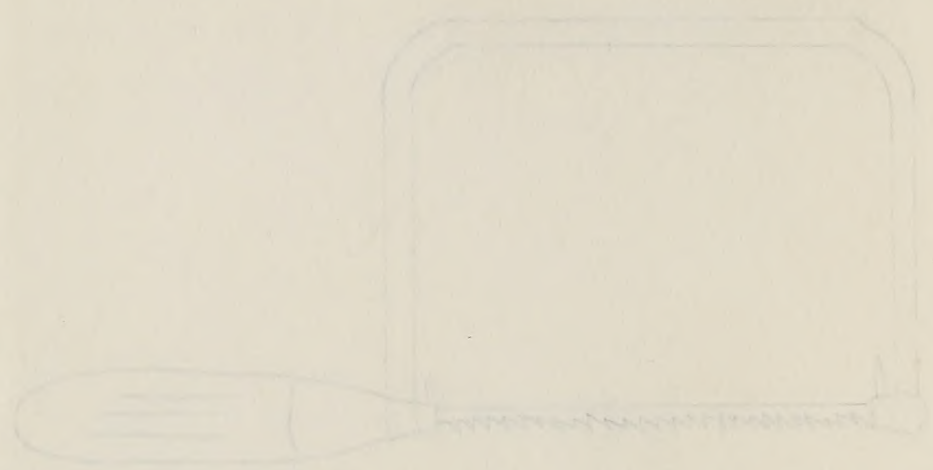
### THE COPING SAW



The coping saw is a light metal-framed saw used for sawing irregular designs from thin wood, such as ply-wood or heavy cardboard. One of the best saws for special class room use. Some have spring-wire frames, but better ones have a light metal frame with adjustable saw blade clamps.



THE COPIER



The copier is a light metal-framed box used for  
making irregular designs from thin wood, such as ply-wood  
or heavy cardboard. One of the best uses for copiers is  
to make copies of designs. Some have spring-steel frames, but better ones  
have a light metal frame with adjustable, non-elastic clips.

The better frames can also be used for holding jeweler's blades and for sawing soft sheet metals. Blades come with different types of ends and with fine, medium or course teeth.

You must learn to use this saw correctly or you will find that the thin blade will break often.



The letter frames can also be used for labeling labels in  
boxes and for making self-stick labels. Boxes come with  
different types of ends and with lines, letters or colors.

Each.

You may want to use this new technology or you will  
find that the old blade will break often.



Sawing with a coping saw, work held in a bench vise.



Sawing with a coping saw, work held on a saw bracket.



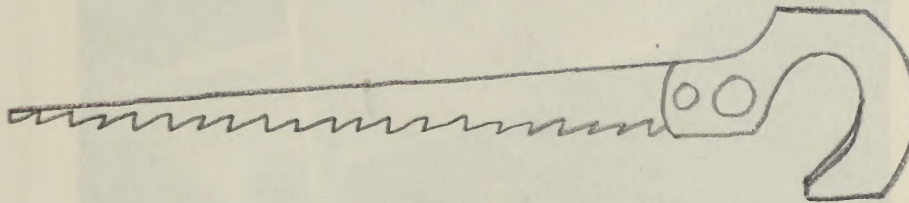


Sending with a copy to you, with help in a good way.



Sending with a copy to you, with help in a good way.

## THE COMPASS SAW



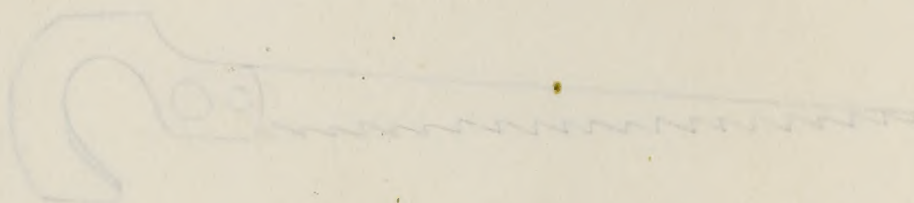
The compass saw is used to cut curves or circles in wood where the frame of a coping saw would be in the way.

The compass saw has a narrow blade which tapers to the outer edge. It has a wooden handle which resembles a common saw handle. The saw blade is fastened to the handle by a thumb screw.

A hole is usually bored in the wood near the line to be cut and then the compass saw is inserted.



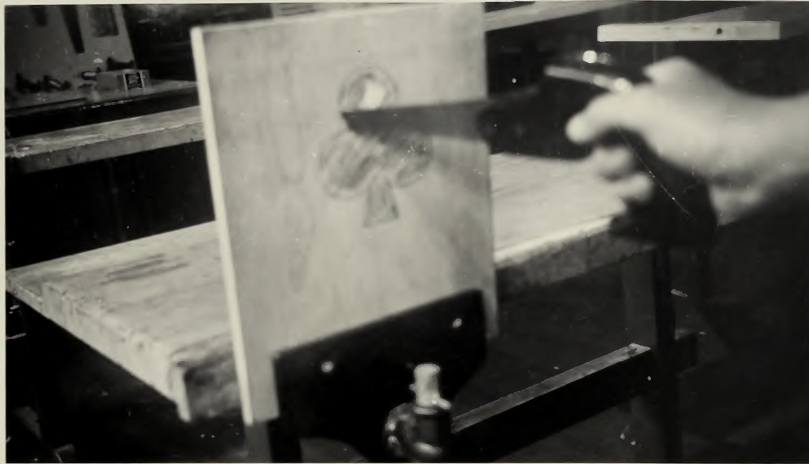
# THE COYOTE SAW



The coyote saw is used to cut curves or angles in wood where the frame of a coping saw would be in the way.

The coyote saw has a narrow blade which tapers to the outer edge. It has a wooden handle which resembles a common saw handle. The saw blade is fastened to the handle by a thumb screw.

A hole is usually bored in the wood near the line to be cut and when the coyote saw is inserted.



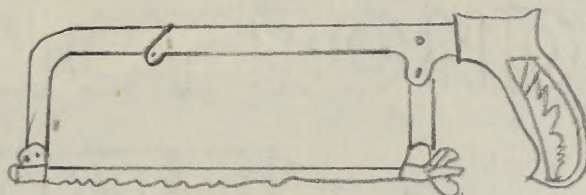
Sawing with a compass saw.





Sealed with a red wax.

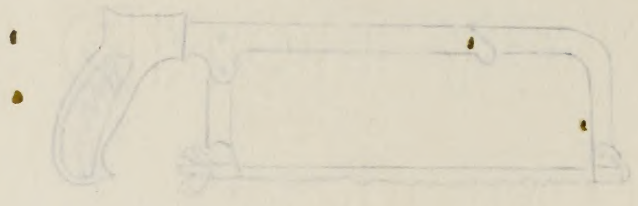
## THE HACK SAW



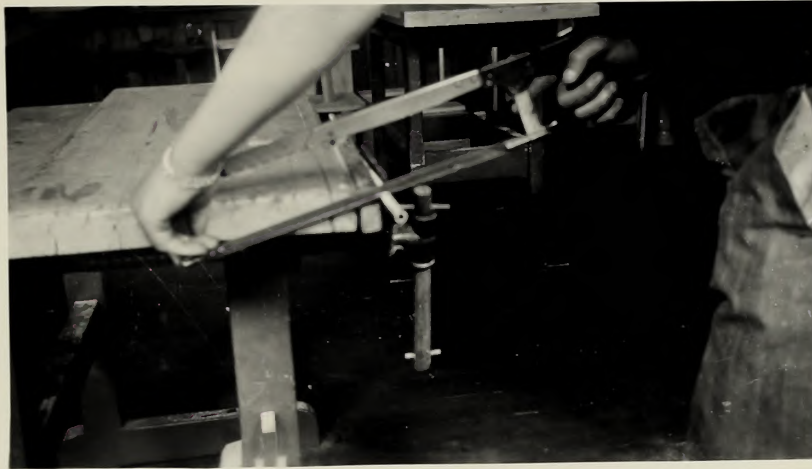
The hack saw is not properly a woodworking tool, but it is often a very convenient tool to have in the shop. It is used for cutting metals. The frame is often adjustable to take blades from 8 to 12 inches in length and is made in various devices to keep the blade under tension. The hack saw blades are made of carbon tool steel, or tungsten alloy steel, and they are very hard. The length of the blade determined by the distance between the holes, the thickness approximately .025 inches and the width varies from  $7/16$  to  $1/2$  inch. The pitch, or number of teeth per inch range from 14 to 32 and they have a standard set. For mild hard material use the 14 pitch; for soft metals you use the 24 pitch.



THE WORK SHED



The work shed is not properly a working tool, but it is often a very convenient tool to have in the shop. It is used for cutting metal. The frame is often adjustable and takes blades from 8 to 12 inches in length and is made in various devices to keep the blade under tension. The back and blades are made of carbon tool steel, or tungsten alloy steel, and they are very hard. The length of the blade determined by the distance between the holes the thickness approximately. One thickness and the width varies from 1/16 to 1/8 inch. The blades, or number of teeth per inch range from 12 to 24 and they have a standard set. For mild steel, the 12 pitch; for soft metals you use the 18 pitch.

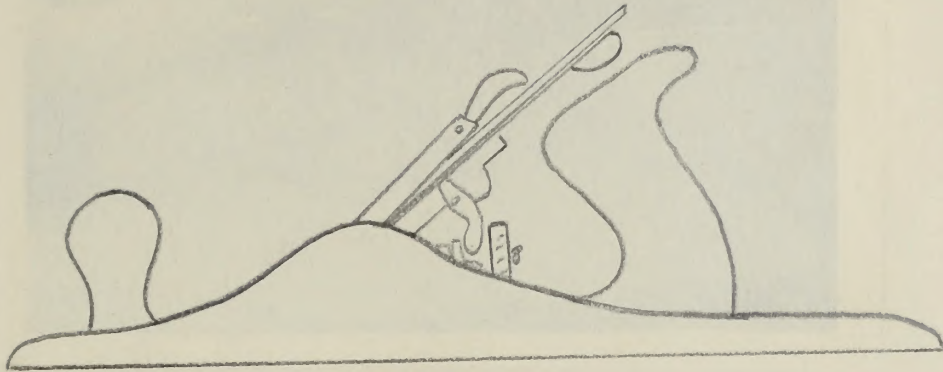


Cutting with a hack saw. Exert enough pressure on the blade to keep it cutting. Lift the blade enough at the end of the stroke to avoid dragging the teeth against the metal on the return because this sliding will dull the teeth.





## THE JACK PLANE



The jack plane is an all purpose plane. It can be used in place of any of the other planes. It is used a great deal for rough planing, smoothing surfaces, edges, and ends, and in squaring stock true to demensions. If you learn to adjust and assemble this plane, you can adjust and assemble almost any type of plane. The jack plane is approximately fourteen inches in length. The long bed of the jack plane will not follow the small irregularities in the surface of a board, and a truer surface can be produced.

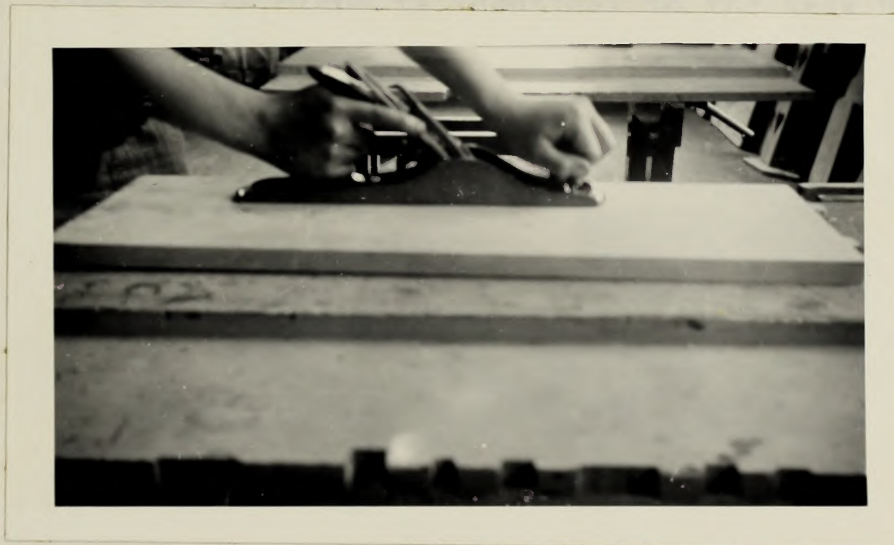




The back plate is an all purpose plate. It can be  
used in place of any of the other plates. It is used  
most often for rough landing, emergency landings, etc.  
The ends are in a position that they are dependent on  
you being in a slight and awkward position. You will  
and especially almost any type of land. The back plate is  
especially designed for use in a light. The back plate  
the back plate will not relieve the seat for landing.  
In the center of a belt, the front section can be  
produced.



Planing edge of a board, held in the bench vise.



Planing the broad surface of a board. Plane with the grain in the uphill direction whenever possible.



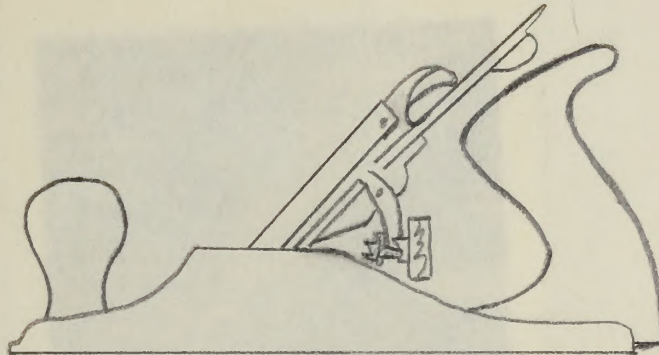


Placing edge of a board, held in the bench vice.



Placing the broad surface of a board. Plane with the  
edge in the upright direction whenever possible.

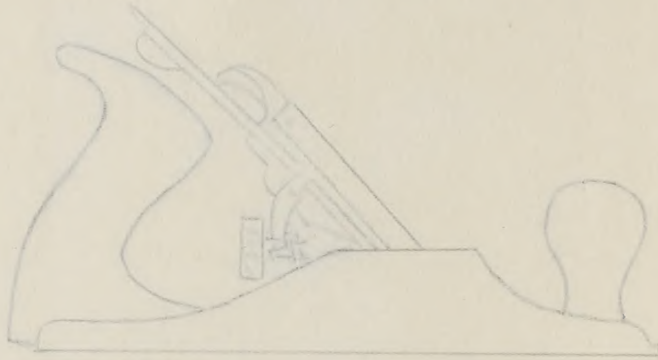
## THE SMOOTH PLANE



The smooth plane is identical to the jack plane, except that it is only 6 to 10 inches long, and is used for smoothing level surfaces, and for small fine work.



## THE SMOOTH PLANE



The smooth plane is identical to the jack plane, except that it is only 6 to 10 inches long, and is used for smoothing level surfaces, and for small fine work.

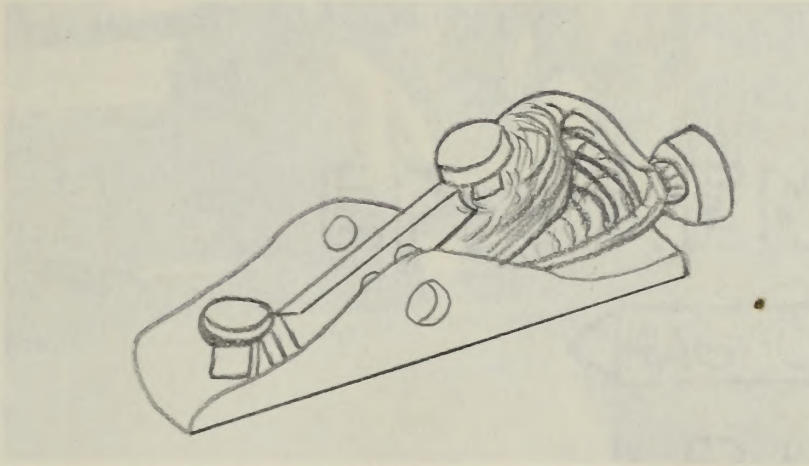


Planing end grain with a smooth plane.



Flamingo and grain with a smooth plane.

## THE BLOCK PLANE



The block plane is used for planing end grain and has no cap iron. The plane iron sets at a lower angle than those of the planes already mentioned, and its bevel is turned up. It is designed to be used with one hand. This makes it easy to use when the work cannot be put into a vise. This plane is the handiest tool for planing corners and chamfers on small pieces of wood. This plane is indispensable in shaping the hulls and spars of model boats and the parts of model airplanes. This plane ranges in length from 4 to 8 inches.



## THE BLACK PLANE



The black plane is used for planing and fitting and has no set iron. The plane iron sets at a lower angle than those of the planes already mentioned, and the level is turned up. It is designed to be used with one hand. This makes it easy to use when the work cannot be put into a vise. This plane is the handiest tool for planing corners and chamfers on small pieces of wood. This plane is indispensable in shaping the pulle and ears of model boats and the parts of model airplanes. This plane ranges in length from 6 to 8 inches.



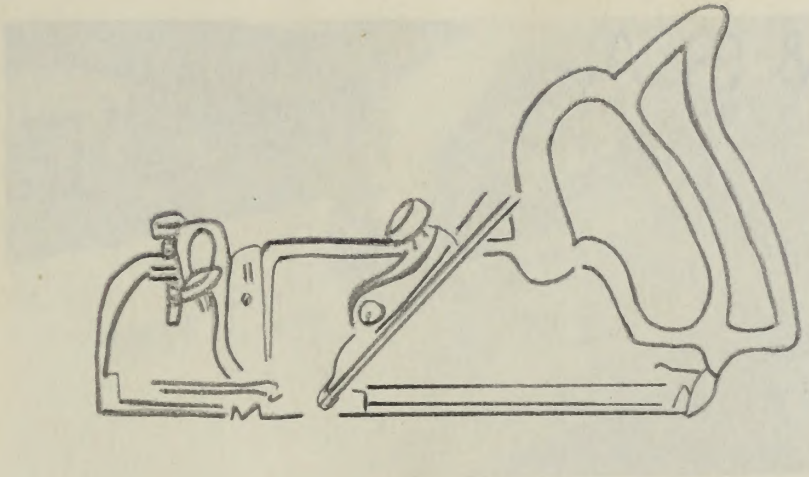
Planing end grain with a block plane.







## THE RABBET PLANE



The rabbit plane is an iron plane used for planing grooves or rabbets on the edges of a board. It has both a depth and a width guage, as well as a spur, which scores in advance of the plane iron, thereby preventing splitting.



THE RUBBER PLANE



The rubber plane is an iron plane used for planing  
grooves or recesses on the edges of a board. It has both a  
depth and a width gauge, as well as a spur, which scores  
in advance of the plane iron, thereby preventing splitting.

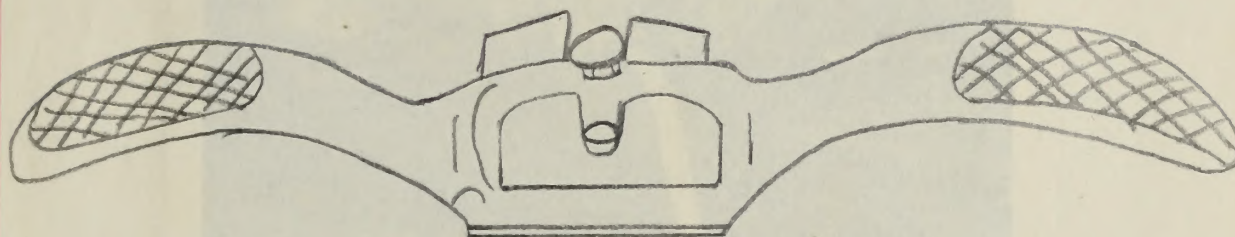


Planing a groove with a rabbet plane.





## THE SPOKESHAVE



The spokeshave is really a very short plane with handles at the sides. The blade can be adjusted so that the thickness of the shaving can be controlled. It is used in shaping and smoothing curved or irregular surfaces. It can be either drawn toward or pushed away from the worker. The blade of the spokeshave, as in a plane, you should take fine shavings of as great length as the nature of the work will permit. The spokeshave is also used to chamfer and to round edges. This is an excellent tool to have in the school woodworking shop, there are many operations when a plane cannot be used that can be taken care of by the spokeshave.





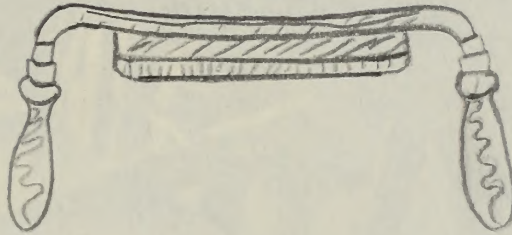


Smoothing with a spokeshave.





### THE DRAW KNIFE



The draw knife is generally used for rough cutting, especially on edges, both straight and curved. This tool is also used in small V-shaped curves where it is impossible to use the spokeshave. The draw knife is made to be pulled and not pushed when it is being used. When light cuts are to be made, the beveled side of the draw knife should be turned down. Care must be taken when using the draw knife to keep it from cutting too deeply thus causing the wood to split ahead of the knife. The blade may be 8, 10, or 12 inches in length.







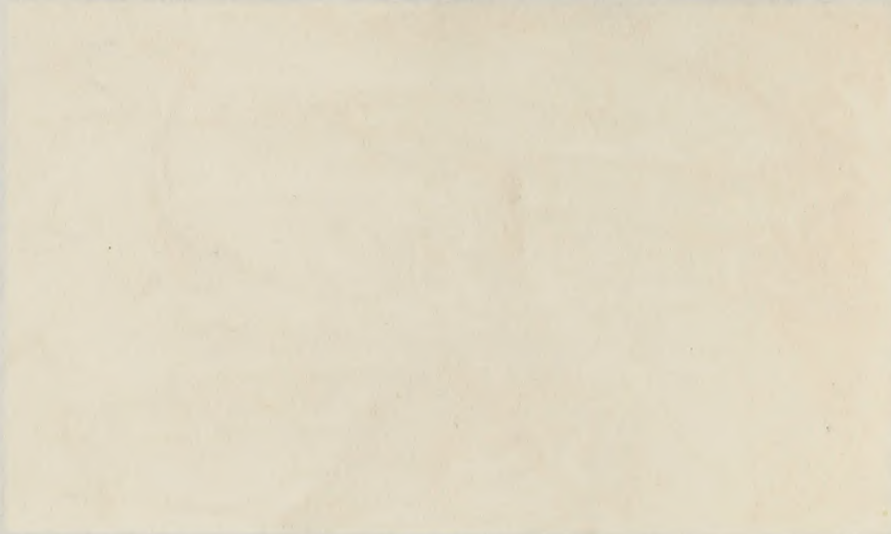
Removing stock with a draw knife.

EFFICIENCY BOOK

PAGE CONTENT

A. R. & P. CO.





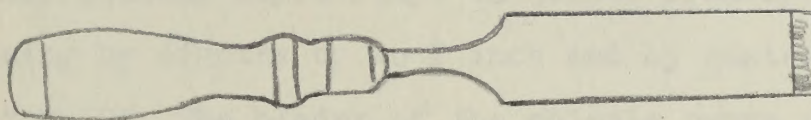
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EFFICIENCY BOARD

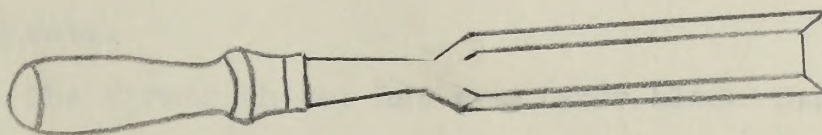
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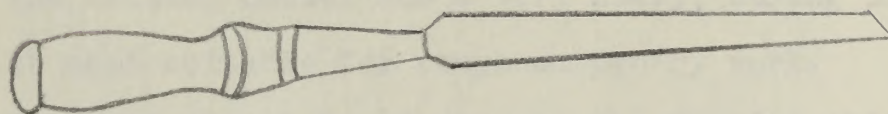
## THE CHISEL



The Tang Chisel



The Socket Chisel

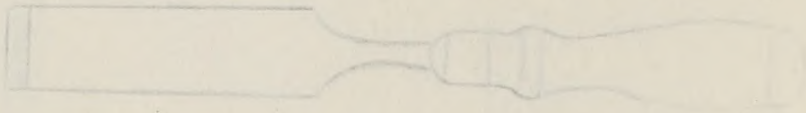


The Mortising Chisel

The chisel is a piece of tool steel, ground to a bevel at one end which is sharpened to produce a keen edge. The main parts of the chisel are the blade, the shank, and the handle. The shank may either be tang or socket. The tang has a sharp pointed tang which is driven into the wooden handle. The socket chisel has a tapered socket into



# THE CHISEL



The Wood Chisel



The Socket Chisel



The Mortising Chisel

The chisel is a piece of tool steel, ground to a bevel at one end which is sharpened to produce a keen edge. The main parts of the chisel are the blade, the handle, and the head. The blade may either be straight or tapered. The head has a sharp section which is driven into the wooden handle. The socket chisel has a tapered socket into

which the taper end of the handle is driven and held fast by friction.

There are twelve chisels in a complete set of any one kind. Cutting edges range in widths from  $1/8$ " to 2" increasing by eighths up to 1 inch and by quater inches from 1" to 2". The blades of the chisels range from 5" to 6" in length; those of butt chisels are 3" to 4" long.

The paring chisel has a thin blade which is usually beveled along the sides. It is used for thin slicing, or paring cuts.

The firmer chisel has a thicker blade than the paring chisel. It is more sturdily made and "firmer" than the paring chisel. Firmer chisels may be used for either light or heavy work.

The framing chisel has a very heavy, strong blade, making it most suitable for rough carpentry work.

The butt chisel is similar to the framing chisel except that the blade is very short.

The mortise chisel is used for cutting out mortises. It is very thick below the handle so that it will not break when it is used as a lever to remove chips from the mortise.



which the taper end of the handle is driven and held fast  
by friction.

There are three chisels in a complete set of  
one kind, and the edges range in width from 1/2" to 3"  
increasing by eighth of an inch and by quarter inches  
from 1" to 3". The blades of the chisels range from 1/2" to  
3" in length those of butt chisels are 1/2" to 4" long.

The paring chisel has a thin blade which is usually  
beveled along the edge. It is used for thinning, or  
paring cuts.

The limber chisel has a thicker blade than the  
paring chisel. It is more strongly made and "limber" than  
the paring chisel. Limber chisels may be used for either  
light or heavy work.

The framing chisel has a very heavy, strong blade,  
made of steel suitable for rough carpentry work.

The joint chisel is similar to the framing chisel  
except that the blade is very sharp.

The mortise chisel is used for cutting out mortises.  
It is very thick below the handle so that it will not

break when it is used as a lever to remove chips from the  
mortise.

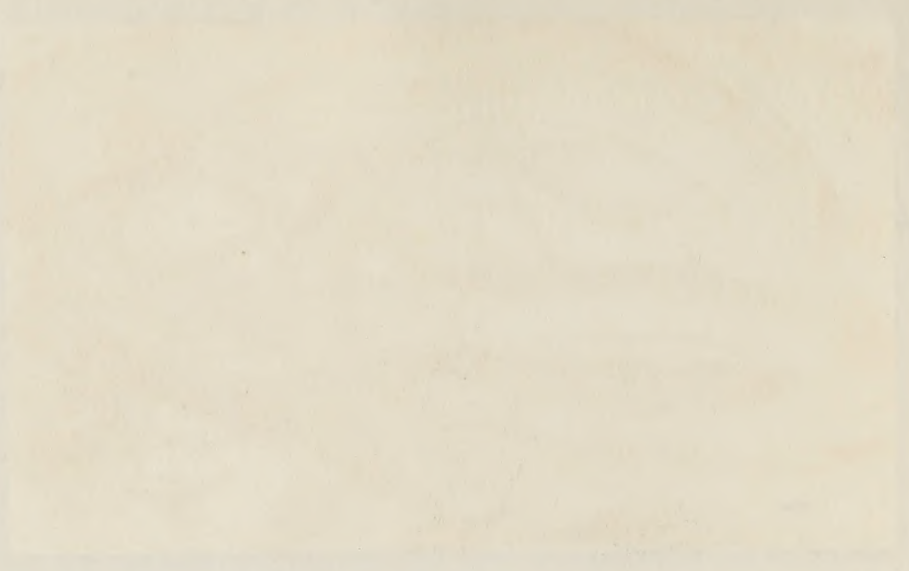


Vertical chiseling on end wood. One hand guiding the blade.



Chiseling across the grain, finishing cut.



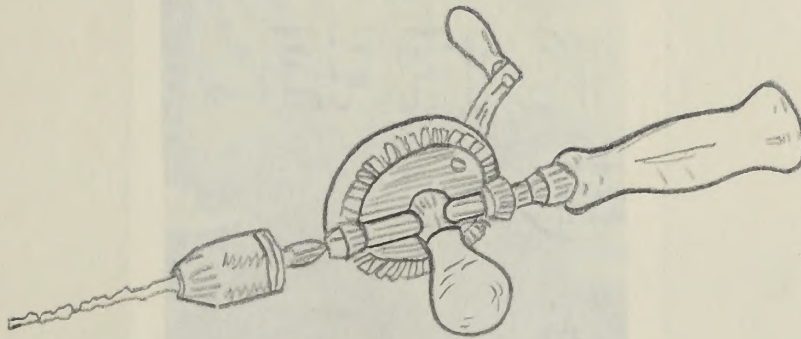


Vertical oblique on the web, the band running the  
place.



Oblique across the web, the band running the

## THE HAND DRILL



The hand drill is used to turn small drills such as the wood boring drills and drill bits. It has a chuck consisting usually of three jaws that hold the drill. The hand drill will turn a bit much faster than will a bit brace. One revolution of the handle will turn a drill four or five times. The hand drill is used for the rapid drilling of small holes, in both wood and metal. Holes in wood should be started with an awl to help center and locate the drill. Holes in metal should be centered with a center punch. Drill points for wood are made in eight sizes from  $1/16"$  to  $11/64"$ . Twist drills principally for metal are made in a vast range of sizes.



## THE HAND DRILL



The hand drill is used to turn small drills such as the wood boring drills and drill bits. It has a chuck consisting usually of three jaws that hold the drill. The hand drill will turn a bit much faster than will a brace. One revolution of the handle will turn a drill four or five times. The hand drill is used for the rapid drilling of small holes, in both wood and metal. Holes in wood should be started with an awl to help center and locate the drill. Holes in metal should be centered with a center punch. Drill points for wood are made in eight sizes from 1/16" to 1/2". Small drills particularly for metal are made in a very large range of sizes.

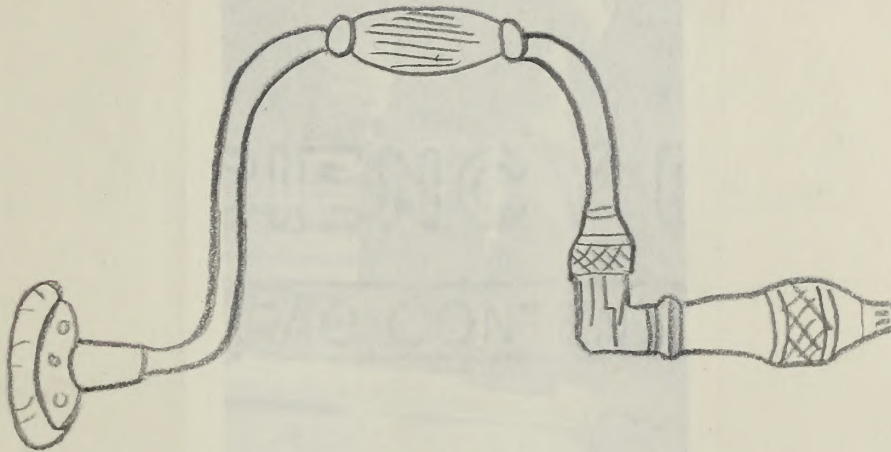


Boring small holes for screws with a hand drill.





### THE BIT BRACE



The bit brace is a tool used for holding a bit securely while boring a hole. The size of braces is given according to the sweep - the diameter of the circle that the handle makes in a complete revolution.

Some bit braces have an attachment fitted which permits the boring of a hole in a corner, or where some object prevents making a full turn with the handle, this is called a ratchet.



## THE PIT BRACE



The pit brace is a tool used for boring a hole. It is usually made of wood or iron and is given a curved shape to the handle to the diameter of the hole that is to be bored. The handle is made in a complete revolution.

Some pit braces have an attachment fitted which permits the boring of a hole in a corner, or where some object prevents making a full turn with the handle, this is called a ratchet.



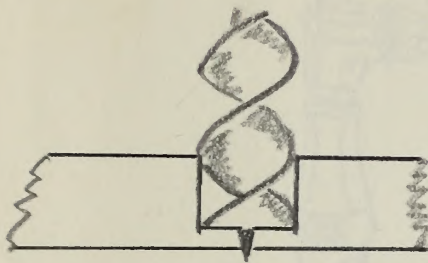
In using a bit and bit brace a try-square will aid in boring a perpendicular hole.



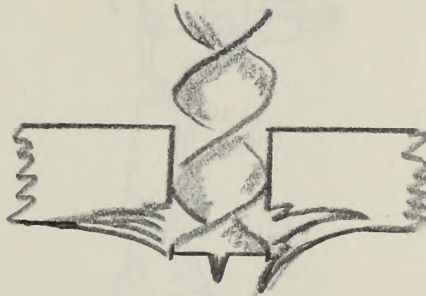
In using a bit and bit brace a life-saver will also

in boring a perpendicular hole.

### A Rule To Remember When Using An Auger Bit.



A.



B.

When using an auger bit never bore completely through the piece of wood; when you bore all the way through you may split the piece as indicated in figure B.

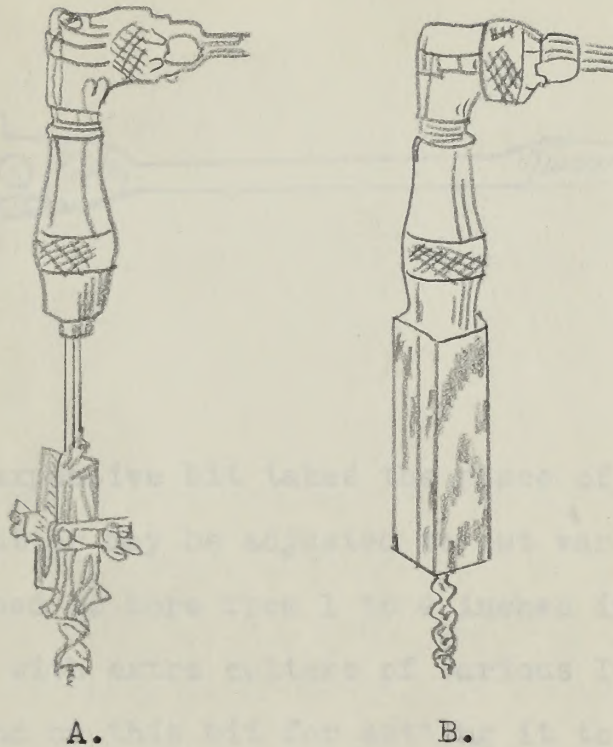
Procedure in boring with an auger bit:

1. Place point of bit in the center punched point and start to bore by holding the knob with the left hand against the chest or stomach.
2. To bore straight you should check from time to time with a try-square.
3. Bore carefully until the point appears on the opposite side, then stop.
4. Bore through from the other side the result will be a clean straight hole.
5. If it is impossible to reverse the boring, clamp a scrap of wood to the back of the stock to prevent splitting.





## THE DEPTH GAUGE



The depth gauge is used when you wish to bore several holes to a desired depth. Figure A. is an adjustable depth gauge; figure B. is a block of wood with a hole bored lengthwise through the center.

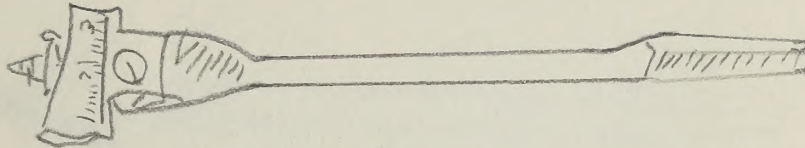


# THE BATH GUAGE



The depth guage is used when you wish to bore several  
 holes to a desired depth. Figure A. is an adjustable depth  
 guage; Figure B. is a block of wood with a hole bored length-  
 wise through the center.

## THE EXPANSIVE BIT



The expansive bit takes the place of many large bits. The cutter may be adjusted to cut various sized holes. It is designed to bore from 1 to 4 inches in diameter and is equipped with extra cutters of various lengths. A guage will be found on this bit for setting it to various diameters.



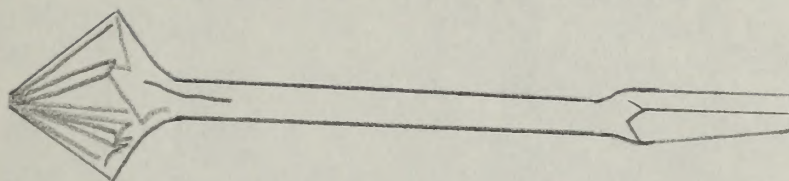
THE V. A. D.

EFFICIENCY BOND  
CONTENTS  
A. R. D.

The following are the names of the persons  
who have been appointed to the various  
positions in the office of the  
Commissioner of the  
Department of the Interior.

EFFICIENCY BOND  
CONTENTS  
A. R. D.

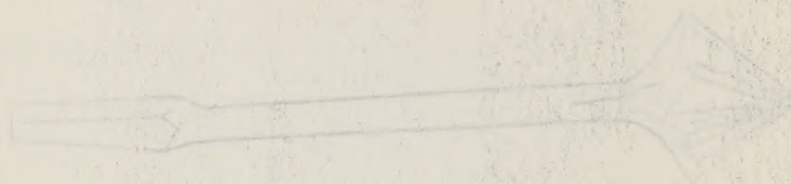
## THE COUNTERSINK



Countersink bits are used to widen screw holes so that the heads of flat-head screws may be flush, or slightly below the surface of the work. The head of the countersink is tapered to a point or conical shaped, as shown above; this is the Rose type of countersink which is most commonly used. This countersink may be used for countersinking holes in soft metals as well as wood.

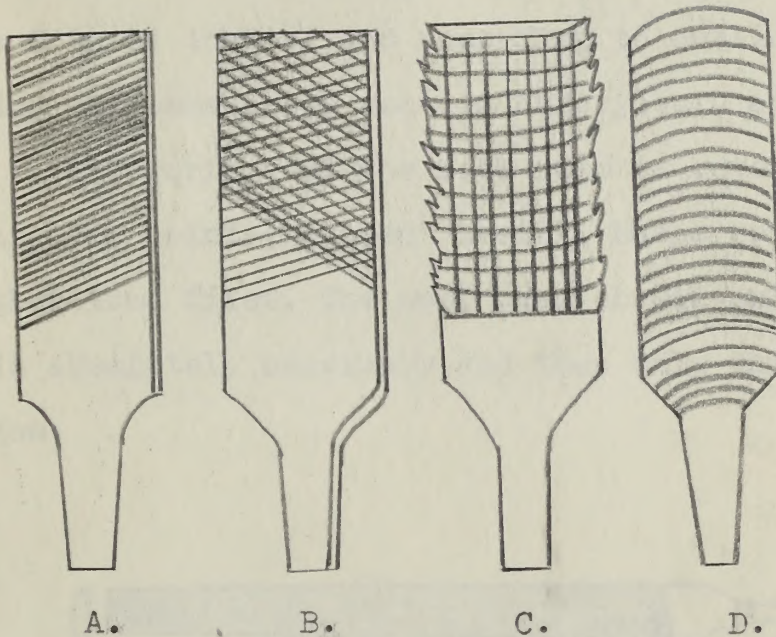


## THE COUNTERSINK



Countersink bits are used to widen screw holes so that the head of flat-head screws may be flush, or slightly below the surface of the work. The head of the countersink is tapered to a point or conical shape, as shown above. This is the basic type of countersink which is most commonly used. This countersink may be used for countersinking holes in soft metals as well as wood.

## THE FILE



A. Single Cut

C. Wood Rasp

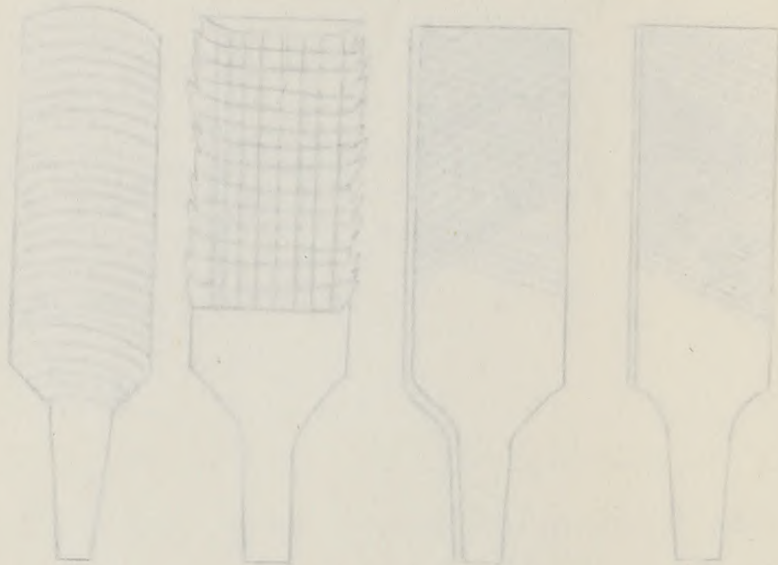
B. Double Cut

D. Open Cut

The file and the rasp are used by woodworkers for reducing and smoothing edges that cannot be worked with a cutting tool. Files are used in many different trades for many different purposes. They are classified according to the shape of their cross section such as square, round, triangular, flat, knife edge, half round etc.; according to the manner in which the serrations or teeth are cut, as



# THE FILE



- A. Single Cut
- B. Double Cut
- C. Wood Rasp
- D. Wood Cut

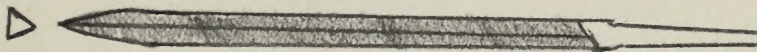
The file and the rasp are used by woodworkers for reducing and smoothing edges that cannot be worked with a cutting tool. Files are used in many different forms for many different purposes. They are classified according to the shape of their cross section such as square, round, triangular, flat, half round, etc. according to the manner in which the serrations or teeth are cut, as

single cut, double cut, and open cut; according to fineness of cut as course, bastard, second cut, smooth and dead smooth; according to length, not including the tang, usually from 3 to 14 inches; and according to outline as blunt, having the same cross section throughout, and taper.

The surface of the wood rasp is covered with rough, triangular points, called "teeth". Rasps cut faster but rougher than files. The wood rasp should only be used when it is absolutely necessary and then only under close supervision.



Half Round File



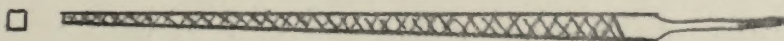
Triangular or Three-cornered File



Flat File



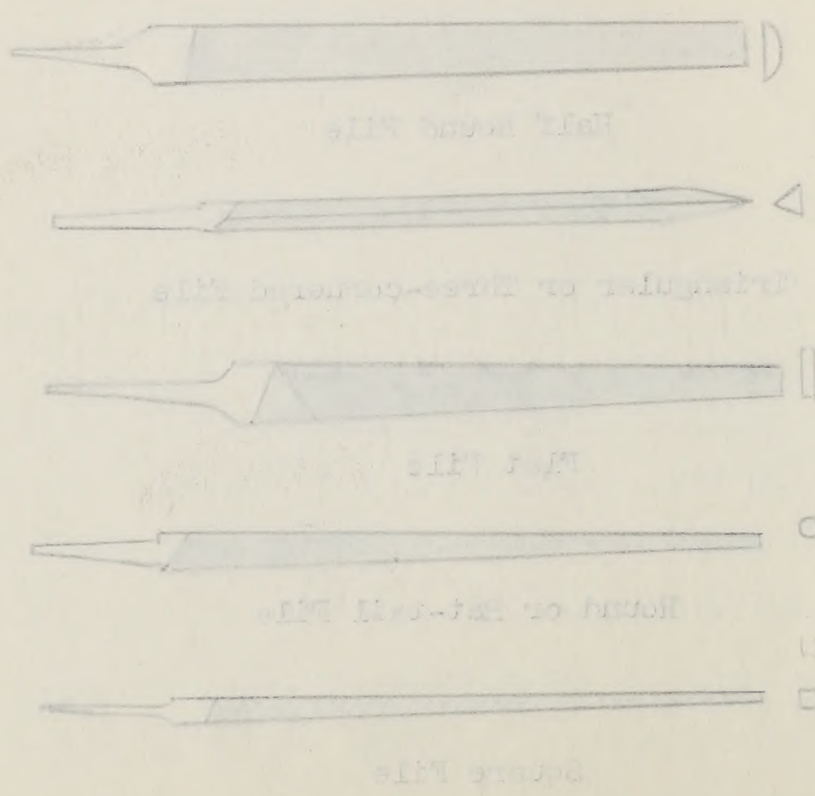
Round or Rat-tail File



Square File



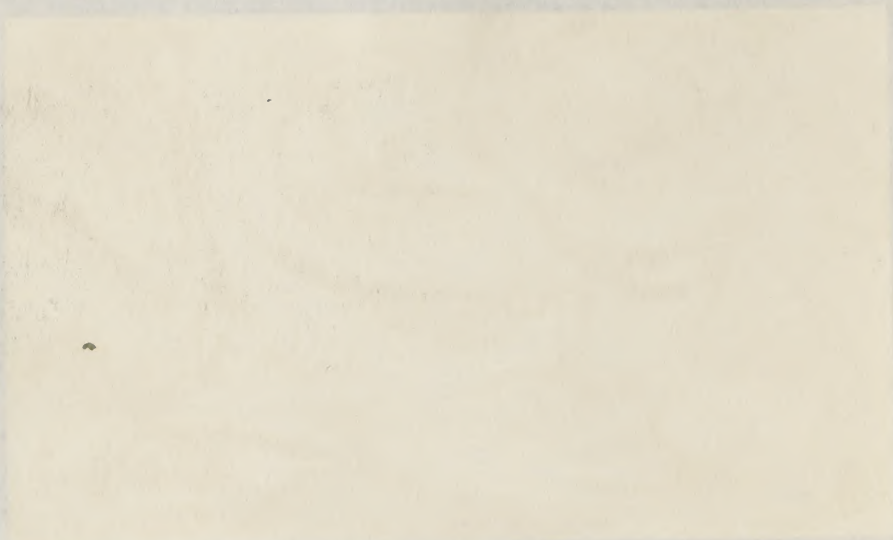
single cut, double cut, and given cut; according to the amount  
of cut is coarse, medium, second cut, smooth and glass  
smooth; according to length, not including the tang, usually  
from 1 to 12 inches; and according to thickness as about  
having the same cross section throughout, and taper.  
The surface of the wood tang is covered with rough,  
irregular points, called "teeth". These cut faster but  
rougher than files. The wood tang should only be used when  
it is absolutely necessary and then only under close super-  
vision.



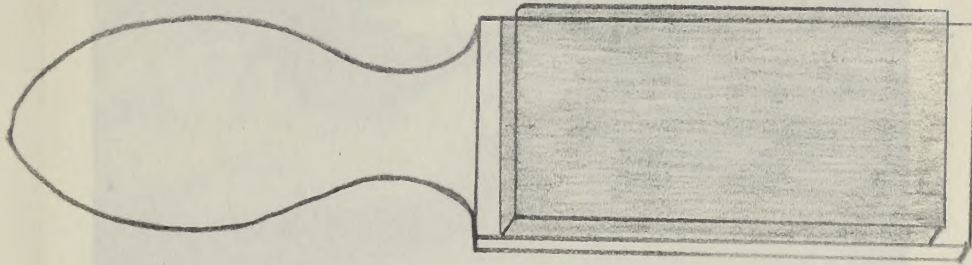


Shaping a curve with a cabinet file.





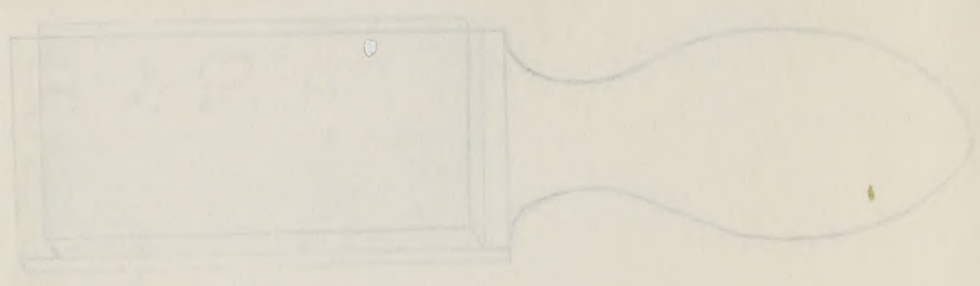
## THE FILE CARD



The file card is used to remove the wood or metal particles from the teeth of wood or metal files. Files will last much longer if they are cleaned with a file card or brush every time they are used. This does not sharpen the file but it will restore its usefulness.



THE END CARD



The file card is used to remove the wood or metal  
particles from the teeth of wood or metal files. This  
will last much longer if the file is cleaned with a file card  
on brush every time they are used. This does not happen  
for the but it will remove the particles.

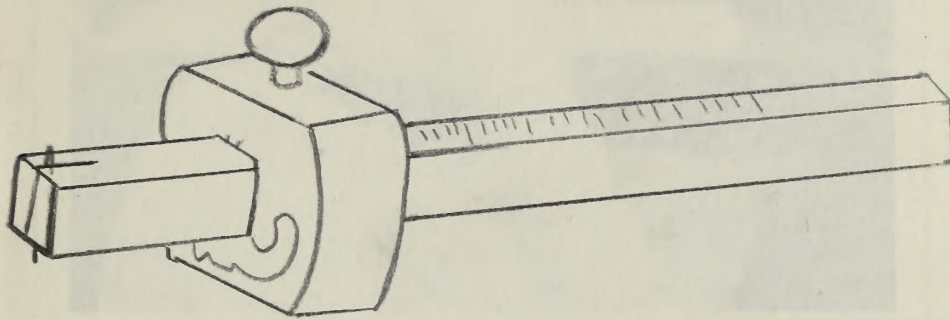


Cleaning a file with a file card.



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## THE MARKING GUAGE



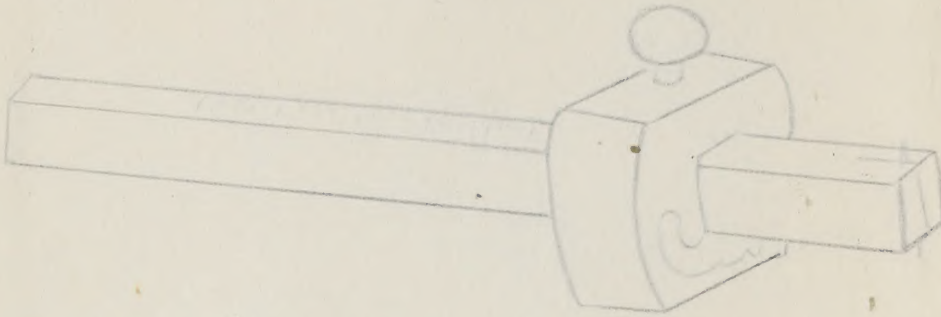
The marking guage is made of wood or steel. This tool is used for marking or guaging widths on narrow pieces of wood, such as table legs, etc. . When using it, move the guage away from you, and tip it slightly forward, keeping the block in contact with the edge or face of the board at all times.

As the spur may be easily bent out of place, most workmen disregard the graduations on the beam and measure the distance to be guaged from the spur to the face of the block with an ordinary rule.

An attachment for curves consists of a bent piece of brass fastened to the block of the guage.



## THE MARKING GAUGE



The marking gauge is made of wood or steel. This tool is used for marking or gauging straight or narrow pieces of wood, such as table legs, etc. When using it, move the gauge away from you, and tip it slightly forward, keeping the block in contact with the edge on face of the board at all times.

As the spur may be easily bent out of place, most workmen disregard the graduations on the beam and measure the distance to be gauged from the spur to the face of the block with an ordinary rule.

An attachment for curves consists of a bent piece of wood fastened to the block of the gauge.



Setting the marking guage with a rule.



Guage by pushing from you whenever possible.

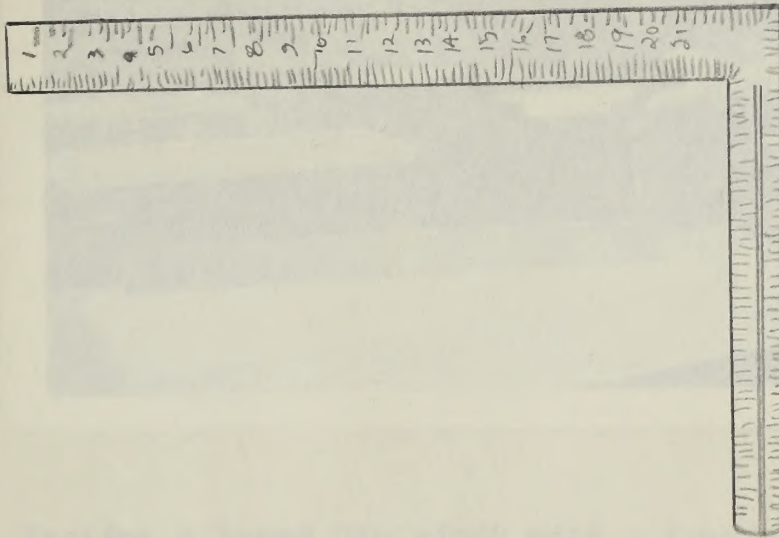


422

Setting the marking gauge with a rule.

Setting the marking gauge with a rule.

## THE FRAMING SQUARE



The framing square is made of steel and measures 16 by 24 inches, or 18 by 24 inches. The framing square is a very important tool, especially to the carpenter, who uses it in laying out many different jobs such as roof framing, stair building etc.. The cabinetmaker uses it mostly for squaring and testing for flatness of large surfaces also testing for squareness in gluing. It is also used for marking lines and for checking the accuracy of work.

The markings on the framing square are inches divided into halves ( $1/2$ ); quarters ( $1/4$ ); eighths ( $1/8$ ); tenths ( $1/10$ ); twelfths ( $1/12$ ); sixteenths ( $1/16$ ); and thirty-seconds ( $1/32$ ).







Testing a board "in wind" with a framing square.

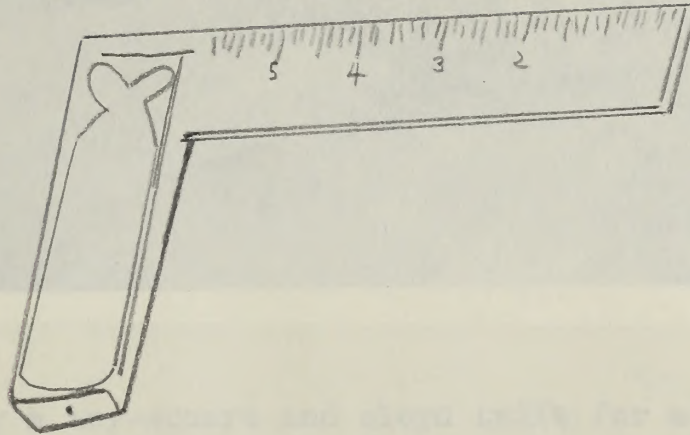


Squaring a line with a framing square.





### THE TRY-SQUARE



The try-square is used to test for squareness, to test frames after they are put together, and to mark lines square across stock.

Its two main parts are, a handle which is made of steel or metal-lined wood and the blade which is a thin piece of steel. The steel blade is marked off like a ruler. By laying one arm against a perfect side, flat and smooth, of a piece of wood, you can prove from position of the other arm whether or not the other side is perfectly straight and square.

Try-squares are usually from four to twelve inches in length and are used for laying out small pieces of work.

It is almost impossible to make a perfect job without using a try-square.

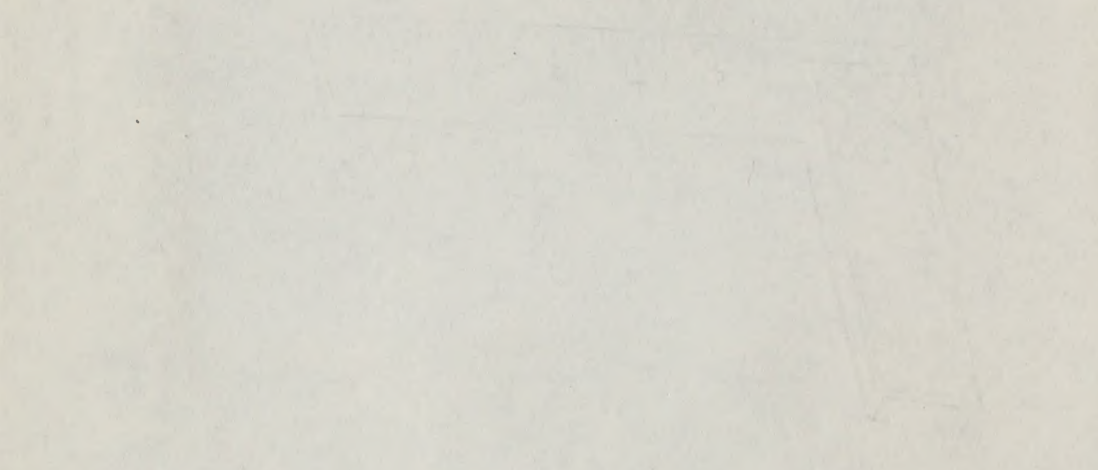


EFFICIENCY

END

REMARKS

APR 8



The following is a list of the names of the persons who have been appointed to the various positions in the office of the Secretary of the Interior, and who have been assigned to the various divisions of the Department.

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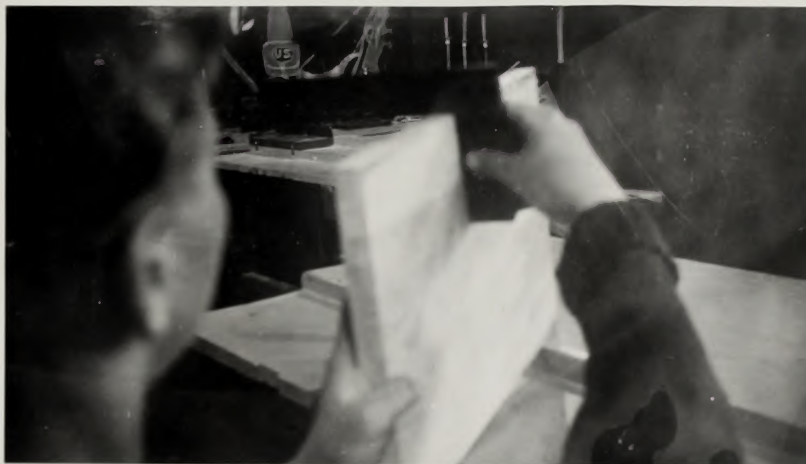
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Using a try-square and sloyd knife for accurate layout.



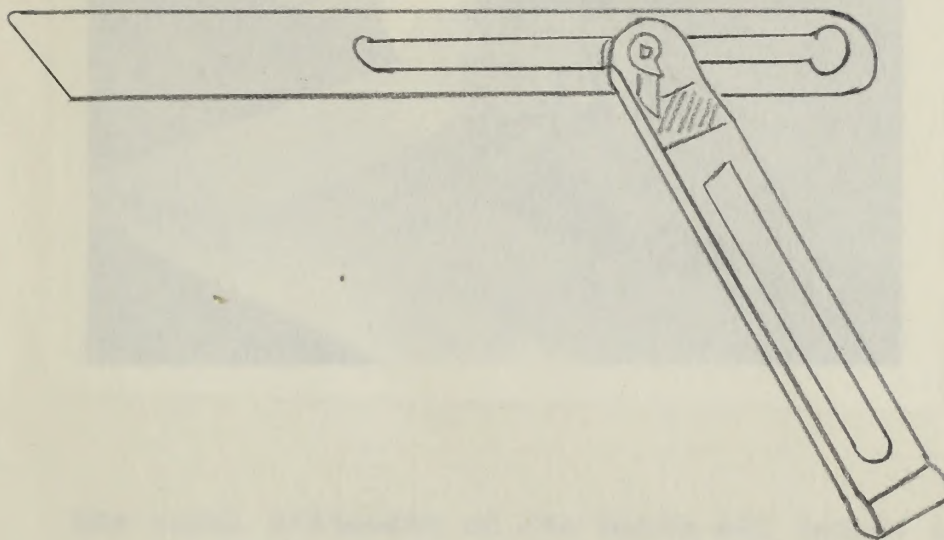
Testing edge for squareness with a try-square.



Using a typewriter and also while for accurate layout.

Leaving edge for adjustment with a typewriter.

## THE T-BEVEL



The T-bevel differs from the try-square in that it has a movable blade. There are two parts, namely, the beam and the blade. The blade may be set at any desired angle up to 180 degrees. The blade can be adjusted to lay out and test angles, chamfers and bevels. It may also be used in duplicating lines drawn at the same angle, as in laying off dovetails for a drawer.



FIG. 1-2-1



The T-bevel differs from the try-square in that it has a movable blade. There are two parts, namely, the beam and the blade. The blade may be set at any desired angle up to 180 degrees. The blade can be adjusted to lay out and test angles, chamfers and bevels. It may also be used in duplicating lines drawn at the same angle, as in laying out dovetails for a answer.



Use equal distances on the blade and tongue of a frame square to set a T bevel at 45 degrees.

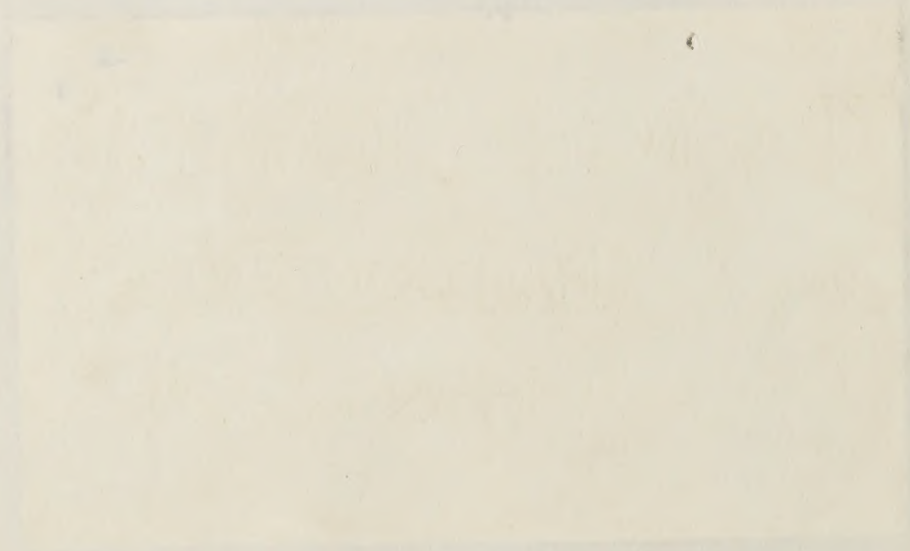


Testing a chamfer with a T bevel.



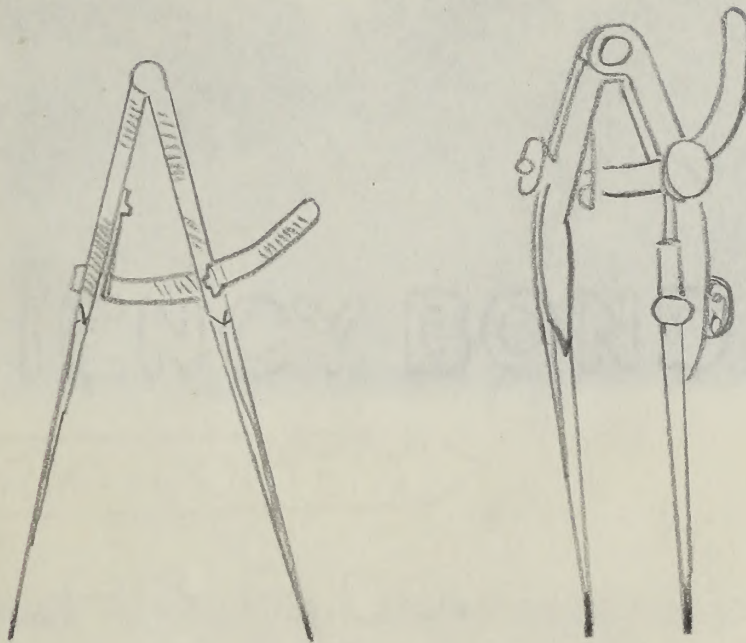


Use equal distances on the blade and tongue of a  
thin square to set a level at 45 degrees.



Setting a chisel with a level.

## THE DIVIDERS OR COMPASSES



The dividers or compasses consist of two slender steel bars or legs sharpened to a fine point and held together one end either by a movable joint or spring. They are made in lengths from 6 to 10 inches, and are used to scribe small circles. A pencil holder may be attached to one of the legs.







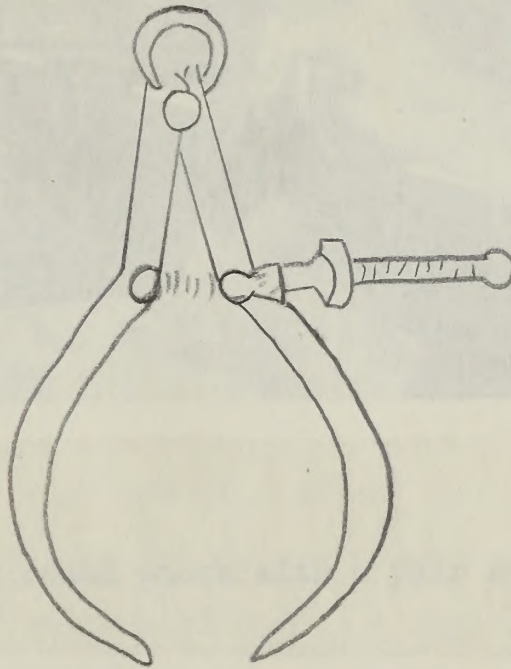
Drawing the arc of a rounded corner with a compass or dividers.





Drawing the end of a rounded corner with a compass  
or divider.

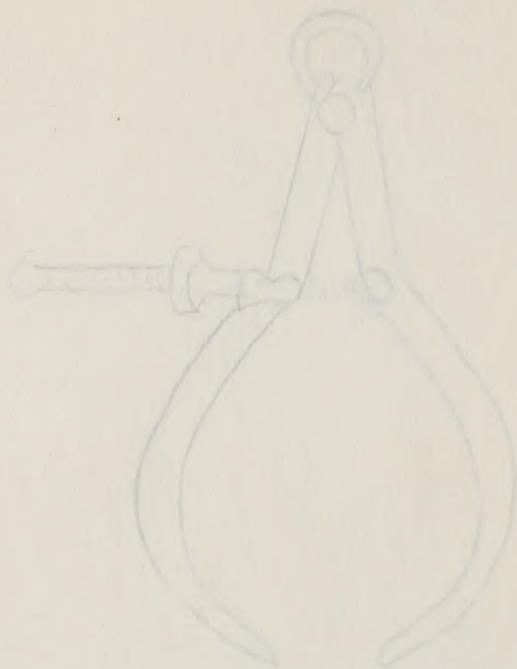
## THE OUT SIDE CALIPERS



The out side calipers are similar in shape to dividers but their legs are bent inward. They are used to measure the out side diameter of round stock.



THE OUT SIDE CALIPERS



The out side calipers are similar in shape to  
dividers but their legs are bent inward. They are used  
to measure the out side diameter of round stock.



Measuring round stock with a pair of calipers.



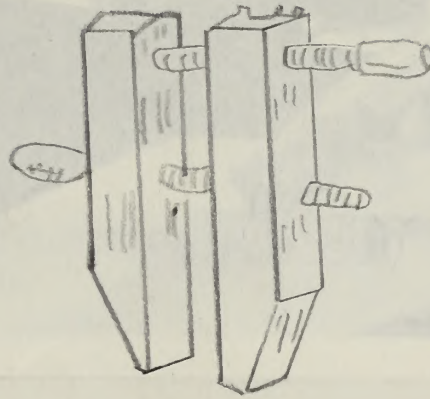
Taking exact measurement on a ruler with a pair of calipers.



Measuring from block with a pair of calipers.

Taking exact measurement on a ruler with a pair of  
calipers.

## THE HANDSCREW



The handscrews are most useful both in clamping up finished work and in holding work under construction. They consist of two jaws made of wood and two spindles, which may be made of wood or steel. They are opened or closed by grasping a handle in each hand and revolving the handscrew. The size of a handscrew is indicated by the length of the jaw in inches ranging from 6 to 18 inches.

When tightening up handscrews on straight work, the middle spindle should first be tightened so that the jaws hold firmly at that point, but are a little open at the end. When the end spindle is now tightened, the jaws will come together at the end and be parallel.



## THE HANDSCREW



The hand screws are most useful both in clamping up finished work and in holding work under construction. They consist of two jaws made of wood and two spindles, which may be made of wood or steel. They are opened or closed by grasping a handle in each hand and revolving the hand screw. The size of a hand screw is indicated by the length of the jaw in inches ranging from 6 to 12 inches.

When tightening up hand screws on straight work, the middle spindle should first be tightened so that the jaws hold firmly at that point, but are a little open at the ends. When the end spindle is now tightened, the jaws will come together at the end and be parallel.

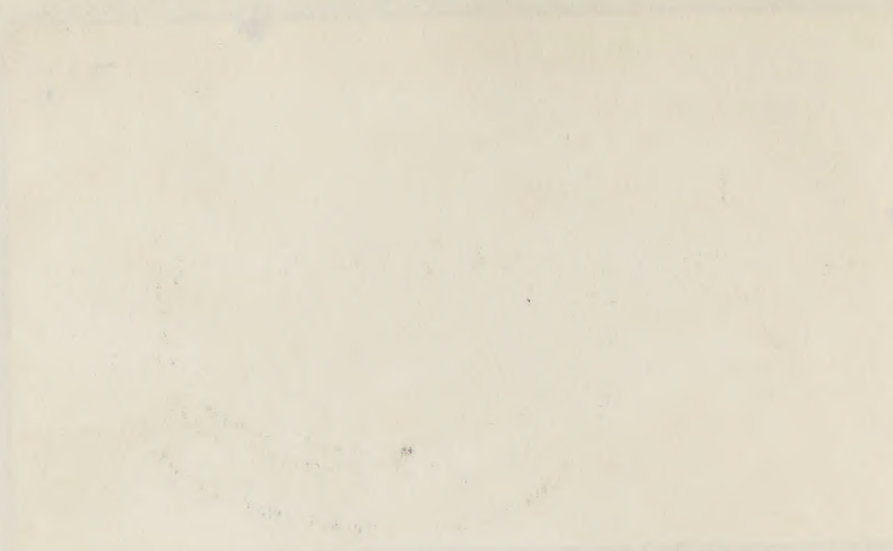


Holding stock in a miter box with a hand screw.



Hand screws used in gluing stock face to face.



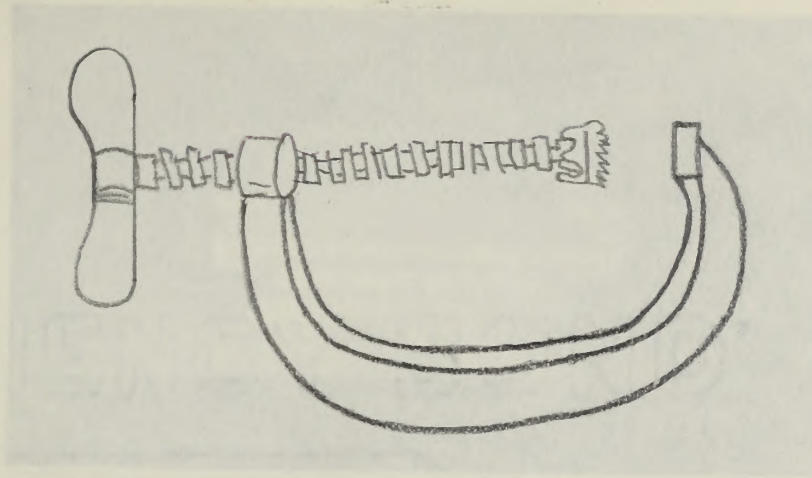


Folding stock in a mixer box with a hand screw.



Hand screws used in gluing stock face to face.

## THE C CLAMP



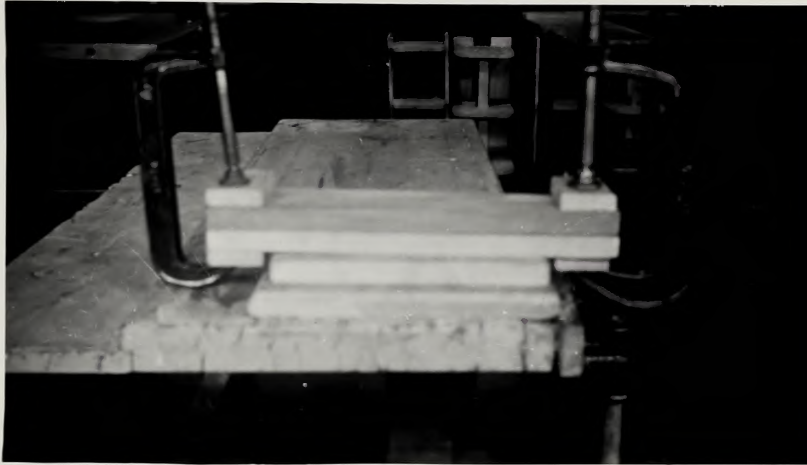
The C clamp is used in clamping small parts face to face or in holding pieces in place in large projects. It is used in repair work and in clamping several pieces together when laying out work and when laying out duplicate parts. The C clamp is made of steel or iron. It comes in several sizes, the smallest which has a one inch opening and the largest which has a twelve inch opening. Essentially this clamp is used in the same manner as the bar clamps.



THE C CLAMP

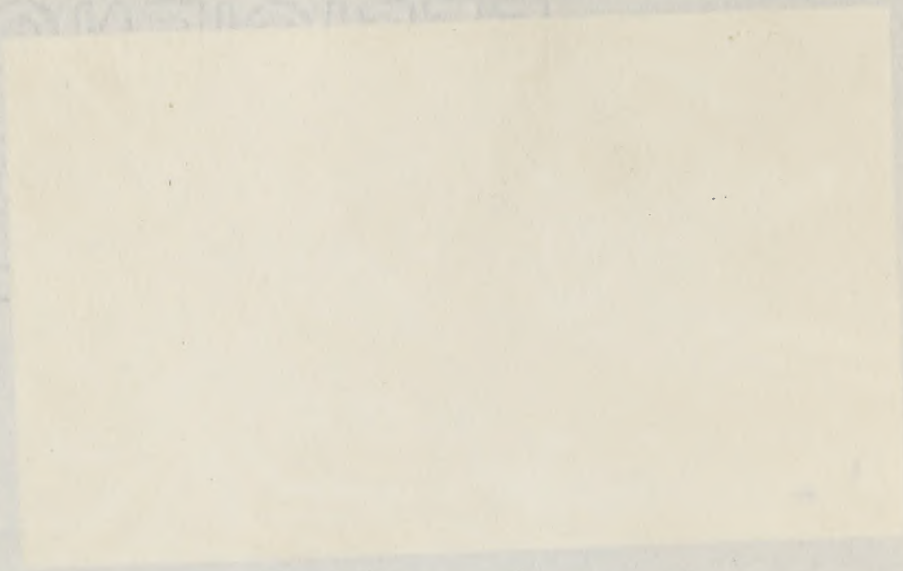


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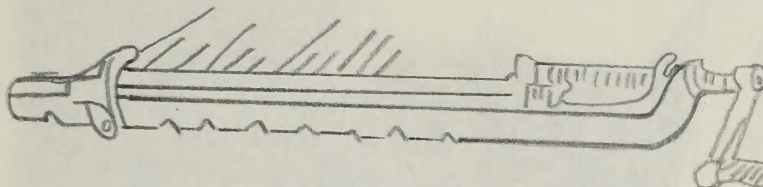
C clamps used for temporary clamping when laying out duplicate joints on several pieces or when gluing stock face to face.





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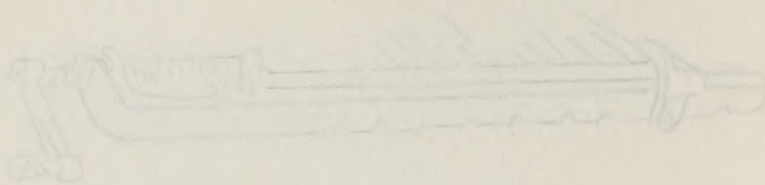
## THE BAR CLAMPS



The bar clamp is one of the most widely used of the various types of clamps. It is used chiefly when gluing edge to edge joints in wide pieces, for gluing up stock which is too wide to be spanned by other clamping devices, and in assembling furniture and frames. Bar clamps are made in sizes from 1 to 8 feet in length. They are made of steel with a screw at one end and an adjustable jaw at the other end. This jaw can be adjusted so that any length, up to the full length of the bar can be used.



THE BAR CLAMP



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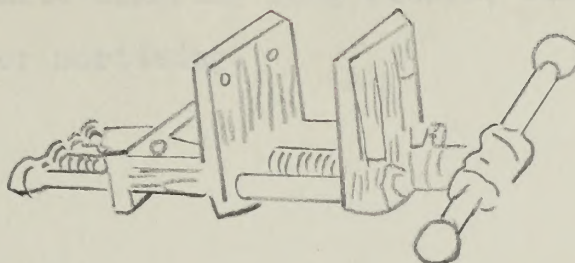


Clamping stock with bar clamps in gluing edge to edge.



Clamping block with bar clamps in lining edge to edge.

## THE BENCH VISE



The bench top is equipped with a side vise and sometimes also with a tail vise. These vises are made either of wood or iron. They have a central screw and parallel guide bars, one on each side of the screw.

Some iron vises are of the "continuous-screw" type and others of the "quick-acting" type. On some quick-acting vises a section of the thread is cut away throughout the entire length of the screw. This permits the movable jaw to be pulled in or out when the screw is in a certain position. A partial turn to the right tightens these quick-acting vises.

Some vises are equipped with an adjustable dog; this is a piece of iron which moves in a slot in the vise jaw. It can be set flush with the top of the vise jaw, or raised above it. A corresponding bench stop fits into holes bored in the bench top so that a piece of wood may be clamped





firmly between the bench stop and the vise jaw.

A tail vise is a convenience on a workbench, because it permits clamping long pieces, such as table legs, for planing or mortising.



EFFICIENT BOND

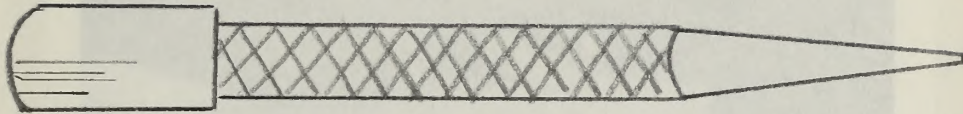
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A. F. & P. CO.

EFFICIENT BOND

MADE IN U.S.A.

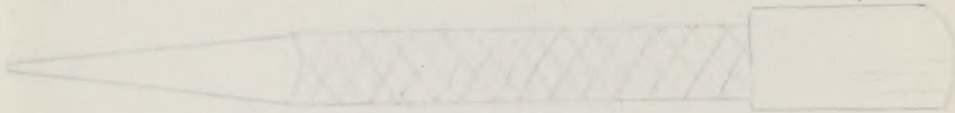
## THE NAIL SET



A nail set is used to complete the driving of a finishing nails, casing nails and brads. It is used to set these nails below the surface of the wood, in fine cabinet work and interior house trim. Always select a nail set with a point slightly smaller than the head of the nail. The nail set is made of steel and is about 4 or 5 inches long and 1/4 inch in diameter.



## THE NAIL SET



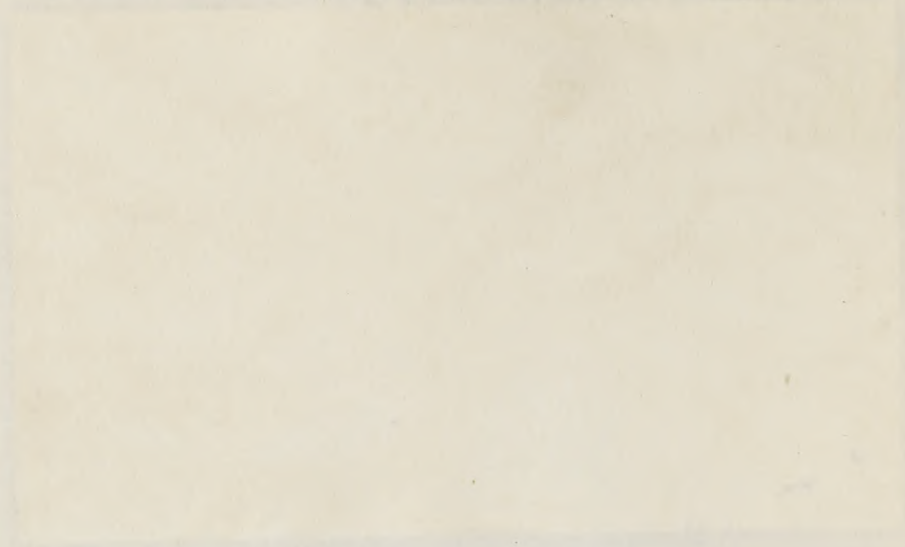
A nail set is used to complete the driving of a finishing nail, casing nail, and brad. It is used to set these in the hollow the surface of the wood, in line with the work and interior house trim. Always select a nail set with a point slightly smaller than the head of the nail. The nail set is made of steel and is about 6 or 8 inches long and  $\frac{1}{4}$  inch in diameter.



How to properly hold a nail set when driving a brad.

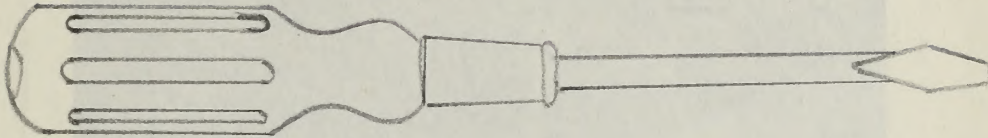
Before attempting to work a screw, see that the screw driver bit is properly ground to fit the slot. Make sure that the bit is of the same width as that of the screw head. The screw driver bit should be ground to fit snugly in the opening of the screw. A screw driver which is improperly ground, will slip out of the screw slot, damage the head of the screw, and mar the surface of the work.





Now to properly hold a needle and when stitching a seam.

## THE SCREW DRIVER



The screw driver is a tool used to drive screws in wood. The screw driver may be purchased with any length of blade from 2 to 18 inches. In the better screw drivers the blade is extended through the handle, and it has a flattened shank to which the handle is riveted preventing the possibility of turning the handle.

Before attempting to turn a screw, see that the screw driver bit is properly ground to fit the slot. Make sure that the bit is of the same width as that of the screw head. The screw driver bit should be ground to fit snugly in the opening of the screw. A screw driver which is improperly ground, will slip out of the screw slot, damage the head of the screw, and mar the surface of the wood.



## THE SCREW DRIVER



The screw driver is a tool used to drive screws in wood. The screw driver may be purchased with any length of blade from 2 to 12 inches. In the better screw drivers the blade is extended through the handle, and it thus is fastened so that the handle is riveted preventing the possibility of turning the handle.

Before attempting to turn a screw, see that the screw driver bit is properly ground to fit the slot. Make sure that the bit is of the same width as that of the screw head. The screw driver bit should be ground to fit snugly in the opening of the screw. A screw driver which is improperly ground, will slip out of the screw slot, damage the head of the screw, and mar the surface of the wood.



Driving a screw with a screw driver.





Involving a series with a series of...

### THE BENCH HOOK



The bench hook is a wooden holding device which is placed on top of the bench to aid in holding the wood while sawing or chiseling it.



# THE BENCH



The bench block is a wooden holding device which is placed on top of the bench to aid in holding the wood while sawing or chiseling it.



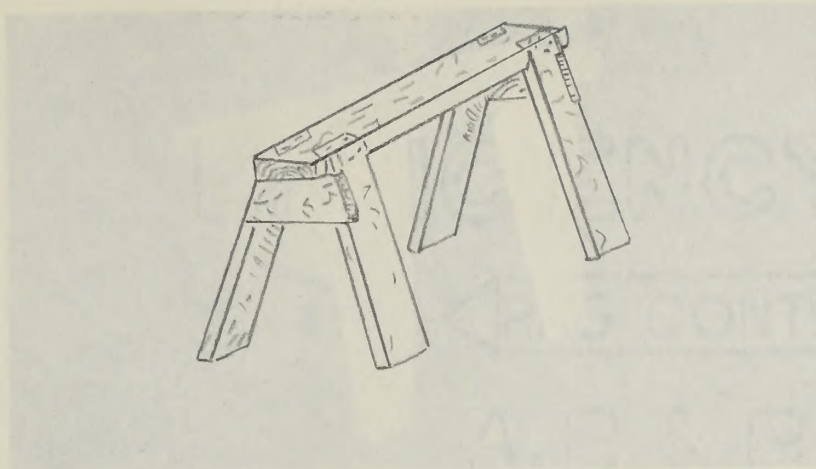
Sawing an end with a back saw and a bench hook.





Sewing on and with a back saw and a bench hook.

## THE SAWHORSE



This is a small portable bench used by carpenters and woodworkers on which to put stock while cutting it roughly to size. They are also used to place the pieces of a project in position, such as a table top, when assembling for gluing.



# THE SAWBENCH

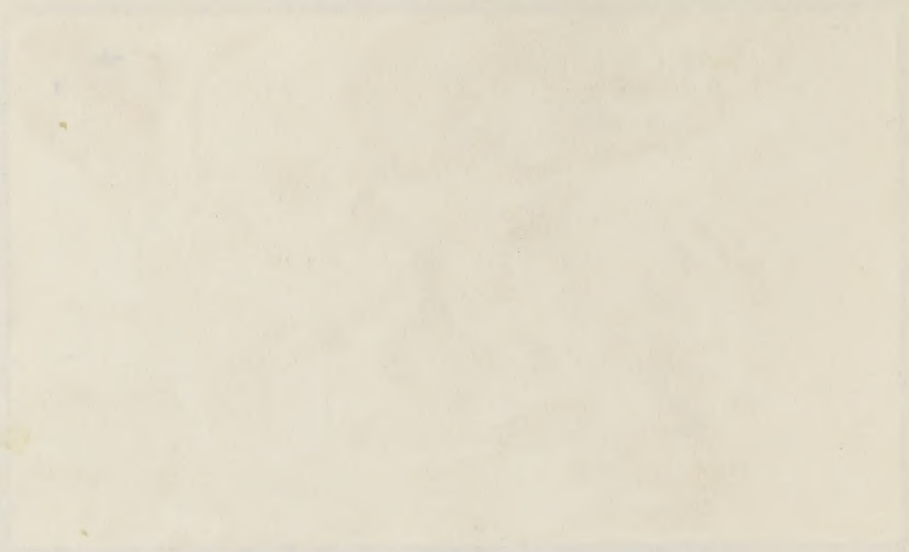


This is a small portable bench used by carpenters and woodworkers on which to put stock while cutting it roughly to size. They are also used to place the pieces of a project in position, such as a table top, when assembling for gluing.



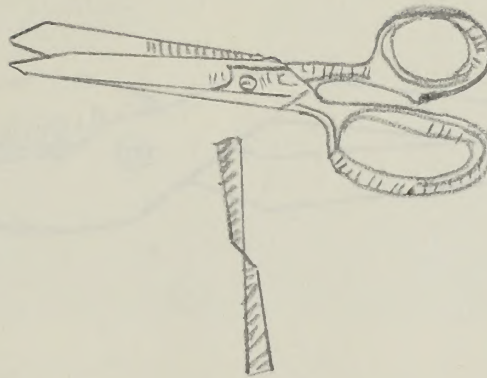
The sawhorse. In a special class I found this size of sawhorse to be the best for all purposes. It measures 8 inches across the top (width), 30 inches in length, 18 inches in height and is made of  $1\frac{1}{2}$  inch stock.





The ashyote. In a special class I found this size  
of ashote to be the best for all purposes. It measured  
2 inches across the top (width), 20 inches in length, 12  
inches in height and its mode of 15 inch stick.

## THE SCISSORS



The scissors are used in a woodworking shop for cutting out patterns and templets of thin cardboard or cloth.

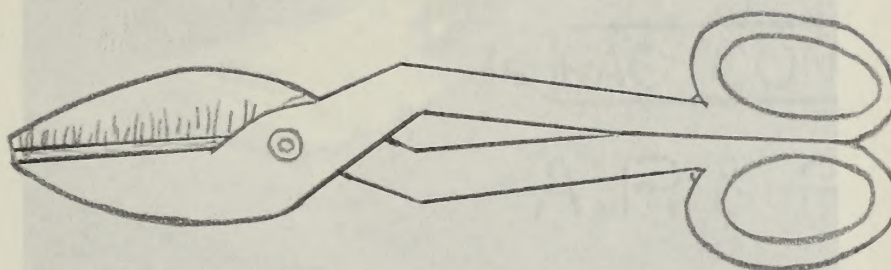


THE SCISSORS



The scissors are used in a woodcutting shop for  
cutting out patterns and letters of this character or  
class.

## THE TIN SNIPS



The tin snips, a long-handled, short-bladed, rugged shears are used for cutting sheet metal and heavy cardboard. The blades of the tinsnips vary in length from 2 to 4 inches. The tin snips should not be used to cut nails, screws, wire, or hardened metal, as these will damage the cutting edge of the tool. The cutting edge should always be kept sharp. The joint should be kept as tight as possible still to permit free operation.



## THE TIN SNIP

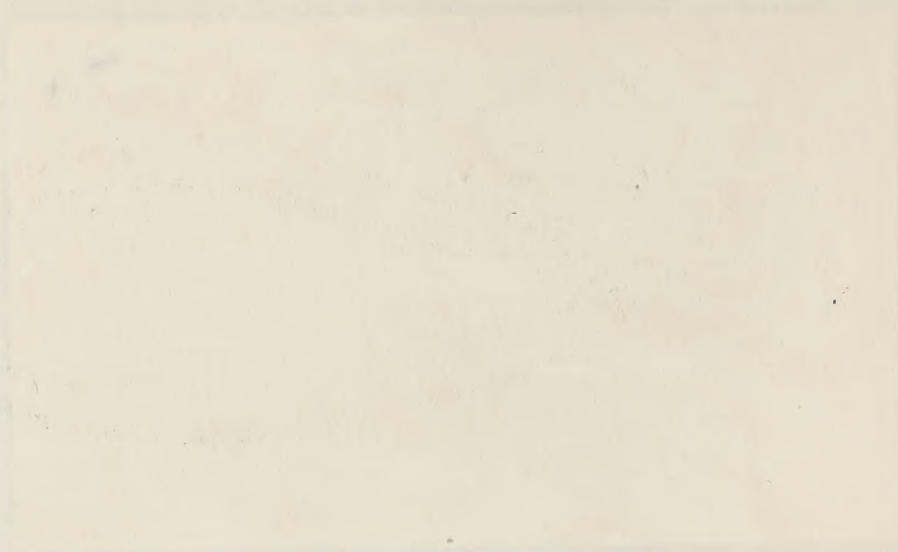


The tin snips, a long-handled, short-bladed, sprung shears are used for cutting sheet metal and heavy cardboard. The blades of the tin snips vary in length from 2 to 4 inches. The tin snips should not be used to cut nails, screws, wire, or hardened metal, as these will damage the cutting edge of the tool. The cutting edge should always be kept sharp. The joint should be kept as tight as possible while still to permit free operation.



Cutting light metal with a pair of tin snippers.





Containing light metal with a pair of tin snippers.

1877-1878

## THE COMBINATION PLIERS



The combination pliers have many uses in the wood shop. They are used to hold, to turn, and to bend many things that your fingers can not. These pliers have a slip joint which means they can be used in two positions.



# THE COMBINATION PLIERS



The combination pliers have many uses in the workshop. They are used to hold, to turn, and to grip many things that your fingers can not. These pliers have a slip joint which means they can be used in two positions.

## THE SIDE CUTTING PLIERS



The side cutting pliers are used for cutting wire and for removing cotter pins. There are also many other uses you will find for side cutting pliers.

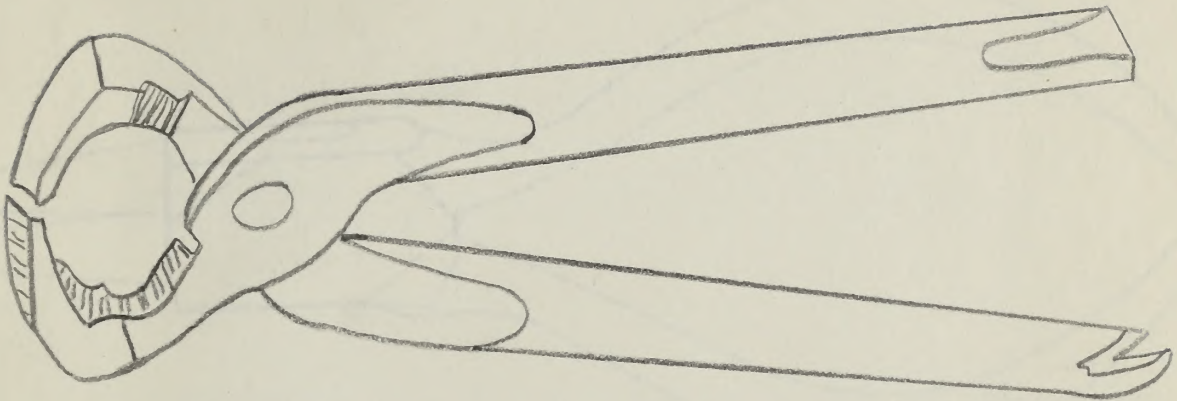


# THE SIDE CUTTING PISTON



The side cutting piston are used for cutting wire and for removing motor glass. There are also many other uses you will find for side cutting pistons.

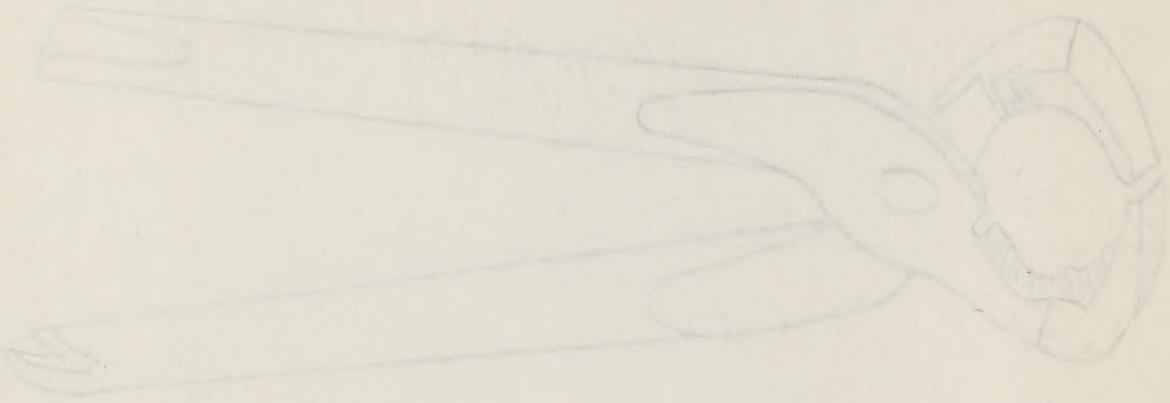
### THE CARPENTER PINCERS



The carpenter pincers are very useful in removing brads and small nails. Many carpenter pincers are made with one handle shaped like a screw driver and the other like a tack puller. This makes this type of pincers a very handy tool.

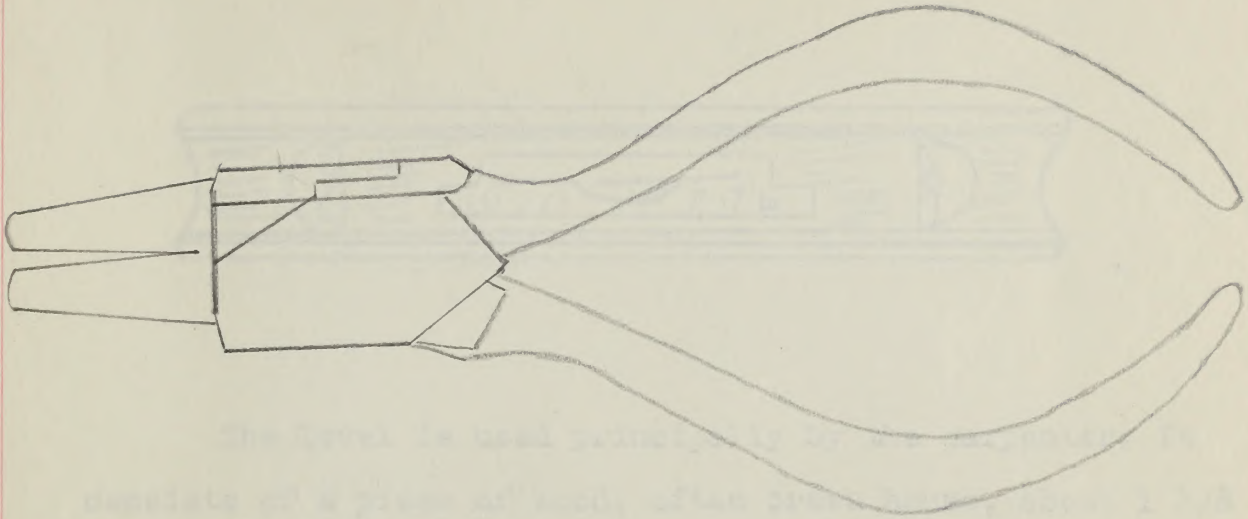


# THE CARPENTER PINS



The carpenter pins are very useful in removing  
bricks and small nails. Very carpenter pins are made  
with one handle shaped like a corner driver and the other  
like a tack puller. This makes this type of pins a  
very handy tool.

## THE ROUNDNOSE PLIERS



The roundnose pliers have round jaws and are used for upholstery work, and forming loops in wire.

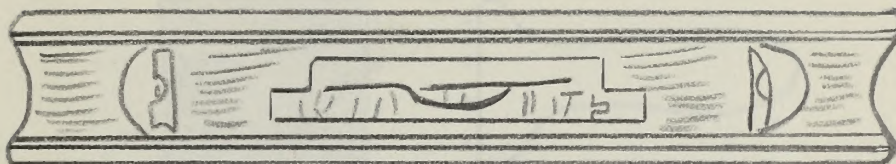


THE FOURTH ILLUSTRATION



The roundness of the pipe is shown, and the pipe is shown for upholding work, and forming loops in wire.

## THE LEVEL

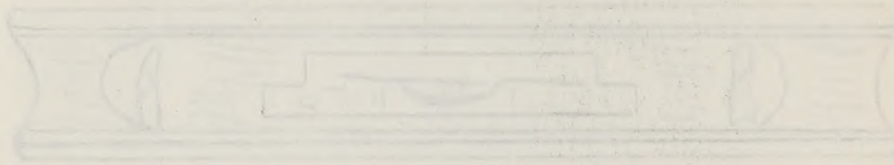


The level is used principally by the carpenter. It consists of a piece of wood, often brass bound, about  $1 \frac{3}{8}$  by 3 by 26 inches, into which a spirit-level glass is fastened horizontally. As the glass is not quite filled, a bubble always remains. When this bubble is in the center of the glass, indicated by lines marked on it, the structure on which the level rests is absolutely horizontal or level.

Most levels also have one or two glasses set vertically to the length of the level. These are called "plumb glasses" and serve to determine if a wall or timber is placed plumb or perpendicular to the horizontal. Levels are also made with an iron body. They vary greatly in length.



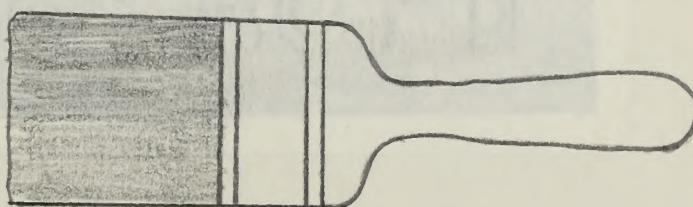
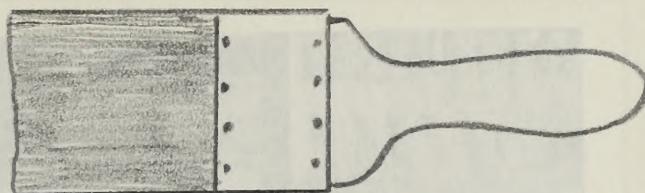
## THE LEVEL



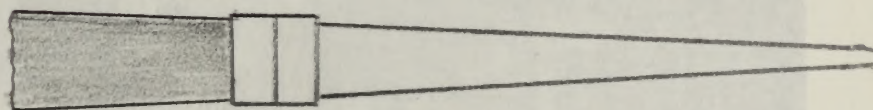
The level is used, principally by the carpenter, to  
consist of a piece of wood, often brass bound, about 2 ft  
by 3 in or thicker, into which a spirit-level glass is  
fastened horizontally. As the glass is not quite filled,  
a bubble always remains. When this bubble is in the center  
of the glass, indicated by lines marked on it, the surface  
on which the level rests is absolutely horizontal  
or level.

Most levels also have one or two smaller spirit-level  
glass in the length of the level. These are called "plumb  
lines" and serve to determine if a wall or timber is  
plumb or perpendicular to the horizontal. Levels  
are also made with an iron body. They vary greatly in  
length.

## BRUSHES



## Paint and Varnish Brushes



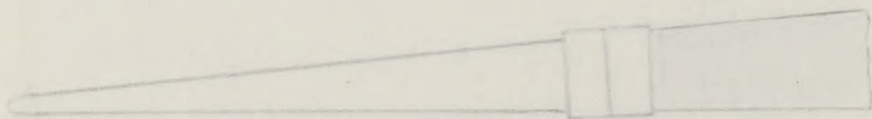
## Glue Brushes



MUS 22



Paint and Varnish Brushes



Oil Brushes

Sample Tool Boards







## CHAPTER VI

### SUPPLIES NECESSARY FOR WOODWORKING IN A SPECIAL CLASS

#### 1. Lumber

Board 1" - 12" x 12" wide 400 feet  
Board 1" - 6" x 12" wide 400 feet  
Board 2" - 6" x 12" wide 400 feet  
Board 1" - 6" x 12" wide 400 feet

Board 1" - 12" x 12" wide 400 feet  
Board 1" - 6" x 12" wide 400 feet  
Board 1" - 6" x 12" wide 400 feet  
Board 1" - 6" x 12" wide 400 feet

## CHAPTER VI

### SUPPLIES NECESSARY FOR WOODWORKING IN A SPECIAL CLASS

Following is a list of supplies necessary for a special class in woodwork.

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Board 1" - 12" x 12" wide 400 feet  
Board 1" - 6" x 12" wide 400 feet

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Board 1" - 6" x 12" wide 400 feet

Board 1" - 6" x 12" wide 400 feet

Board 1" - 6" x 12" wide 400 feet





## CHAPTER VI

Supplies Necessary for Woodworking in a Special Class

## I. Lumber

|      |                   |   |     |    |     |      |          |
|------|-------------------|---|-----|----|-----|------|----------|
| Pine | 1"                | - | 10" | to | 12" | wide | 400 feet |
| Pine | 1"                | - | 6"  | to | 8"  | wide | 400 feet |
| Pine | 1"                | - | 2"  | to | 4"  | wide | 200 feet |
| Pine | 1 $\frac{1}{2}$ " | - | 6"  | to | 10" | wide | 300 feet |

|           |      |  |     |    |     |      |          |
|-----------|------|--|-----|----|-----|------|----------|
| Whitewood | 5/8" |  | 10" | to | 12" | wide | 400 feet |
| Whitewood | 5/8" |  | 6"  | to | 8"  | wide | 200 feet |
| Whitewood | 1"   |  | 10" | to | 12" | wide | 400 feet |
| Whitewood | 1"   |  | 4"  | to | 8"  | wide | 200 feet |

For special projects with an excellent student in woodworking in a special class I would also have the following, if it was possible to obtain.

|          |    |   |     |    |     |      |          |
|----------|----|---|-----|----|-----|------|----------|
| Gum Wood | 1" | - | 10" | to | 12" | wide | 300 feet |
| Gum Wood | 1" | - | 6"  | to | 8"  | wide | 200 feet |

|                       |      |  |            |    |     |      |          |
|-----------------------|------|--|------------|----|-----|------|----------|
| Mahogany (Philippine) | 5/8" |  | 10"        | to | 12" | wide | 300 feet |
| Mahogany (Philippine) | 1"   |  | 10"        | to | 12" | wide | 400 feet |
| Mahogany (Philippine) | 1"   |  | 2"         | to | 8"  | wide |          |
|                       |      |  | (Assorted) |    |     |      | 400 feet |

|                |       |         |
|----------------|-------|---------|
| Dowels (Birch) | 3/16" | 3 dozen |
|                | 1/4"  | 4 dozen |
|                | 3/8"  | 4 dozen |
|                | 1/2"  | 3 dozen |
|                | 5/8"  | 2 dozen |
|                | 1"    | 2 dozen |

|                |       |
|----------------|-------|
| Ply-Wood (Fir) | 3 ply |
|----------------|-------|

|          |                |
|----------|----------------|
| 6 Panels | 1/4" x 4' x 8' |
|----------|----------------|





Ply-Wood Cont.

5 ply

3 Panels  $3/4''$  x 4' x 8'Masonite Presswoods4 Panels  $1/4''$  x 4' x 12'

## II. Fasteners

Screws, Flat Head

1 box  $1/2$  - 6  
 1 box  $5/8$  - 6  
 1 box  $3/4$  - 6  
 1 box  $7/8$  - 6  
 1 box 1 - 8  
 1 box  $1\frac{1}{4}$  - 8  
 1 box  $1\frac{1}{4}$  - 10  
 2 boxes  $1\frac{1}{2}$  - 8  
 1 box  $1\frac{1}{2}$  - 12  
 2 boxes 1  $3/4$   
 1 box 2 - 10  
 1 box  $2\frac{1}{2}$  - 12  
 1 box 3 - 16

Screws, Round Head

1 box  $3/8$  - 5  
 1 box  $5/8$  - 5  
 1 box  $3/4$  - 6  
 1 box  $7/8$  - 6  
 2 boxes 1 - 8  
 1 box  $1\frac{1}{4}$  - 8  
 2 boxes  $1\frac{1}{2}$  - 8  
 1 box  $1\frac{1}{2}$  - 10  
 1 box  $1\frac{1}{2}$  - 12  
 1 box 1  $3/4$  - 10  
 1 box 2 - 10

Brads, Wire

1 box  $3/8$  - 20  
 2 boxes  $1/2$  - 20  
 1 box  $5/8$  - 19  
 1 box  $3/4$  - 18  
 1 box  $7/8$  - 18  
 1 box 1 - 15  
 2 boxes 1 - 18  
 1 box  $1\frac{1}{4}$  - 15





Brads, Cont.

2 boxes  $1\frac{1}{4}$  - 18  
 1 box  $1\frac{1}{8}$  - 15  
 1 box  $1\frac{1}{8}$  - 17  
 2 boxes  $1\frac{1}{8}$  - 18  
 1 box  $1\frac{3}{4}$  - 15  
 1 box 2 - 12  
 1 box  $2\frac{1}{4}$  - 13  
 1 box  $2\frac{1}{2}$  - 13  
 1 box 3 - 14

Nails, Flat Head

1 box 1 - 15  
 1 box 1 - 17  
 1 box  $1\frac{1}{4}$  - 17  
 1 box  $1\frac{1}{2}$  - 15  
 1 box  $1\frac{3}{4}$  - 15  
 1 box 2 - 13  
 2 lbs. 6d - common  
 2 lbs. 8d - common

Tacks

1 box  $2\frac{1}{2}$  oz. Gimp  
 1 box 4 oz. Carpet  
 1 box 6 oz. Carpet

Stove Bolts

## Flat Head

1 box  $3/16$  x 1"  
 1 box  $1/4$  x  $1\frac{1}{4}$ "

## Round Head

1 box  $1/4$  x  $3\frac{1}{2}$ "

Corrugated Fasteners

2 boxes  $3/8$  x 5 (100 in each box)  
 2 boxes  $5/8$  x 5 (100 in each box)

Glue

## Liquid

6 jars of  $1/2$  pint each





III. Sandpaper

1 quire - No. 00  
2 quires - No. 0  
1 quire - No. 1/2  
2 quires - No. 1  
1 quire - No. 1½  
3 quires - No. 2

IV. Steel Wool

1 pound bundle No. 0  
1 pound bundle No. 1

V. Paints, Oils, Etc.

## Enamels

1 qt. Red  
1 qt. Yellow  
1 qt. Blue  
1 qt. Gray  
1 qt. White  
1 qt. Black

## Stains

1 qt. Maple  
2 qts. Red Mahogany  
1 qt. Brown Mahogany  
1 qt. Oak

## Alcohol

1 gallon

## Shellac

1 gallon (White)

## Turpentine

1 gallon

## Varnish

1 gallon





### Oils

2 qts. Linseed Oil  
1 qt. Machine Oil  
1 qt. Spindle Oil

### Filler

2 pounds of clear

### VI. Plastic Wood

1 pound can

### VII. Putty

5 pound pail

### VIII. Wax, Paste

1 pound can

## WOOD FINISHING

The finishes that will ordinarily concern a special class teacher are paint finishes, enamel finishes, shellac and varnish finishes. Lacquer finishes should be avoided in the special class because they are too difficult to apply. Either shellac or varnish finishes may be applied over stained wood.

### Stain

In a special class woodworking shop commercial oil stain should be used exclusively because it is easy to apply and produces very good results; where as water, spirit and chemical stains are very difficult to apply and are apt to ruin a nicely made project.





### Filler

The purpose of a wood filler is to fill up the pores in the wood so that the finish will be smooth and even when it is varnished. There are a number of different kinds of fillers on the market, but for the purpose of a school shop only shellac and paste fillers are important.

### Varnish

Varnish is used to produce a smooth hard finish on wood. Because varnish dries slowly, a clean and dry place should be provided in which to work. There are several different kinds of varnish. The kind to be used on a particular job depends upon the finish desired and the kind of wear it will have to stand. The special class teacher should be interested in only two kinds, Spar varnish and Rubbing varnish.

Spar Varnish is made to withstand dampness. It is used on furniture which is likely to have water spilled on it, but is not especially desirable if a high polish is necessary.

Rubbing Varnish is used on furniture where a high polish is desired. It will not stand wear like floor varnish or stand dampness like spar varnish.

### Shellac

Shellac should be used as a wood filler. Since





shellac does not produce as hard a surface as varnish, it is not as durable when subject to hard usage. It is not a waterproof or heat resisting finish and will turn white when exposed to excessive moisture or heat. For this reason, shellac should not be used as a finishing coat for porch or outside furniture.

#### Shellac Finish

1. Apply coat of stain
2. Allow to dry 6 hours
3. Apply paste filler
4. Wipe off filler across the grain
5. Allow to dry 12 hours
6. Apply coat of shellac
7. Allow to dry 8 hours
8. Rub smooth with steel wool
9. Apply second coat of shellac
10. Allow to dry 8 hours
11. Rub smooth with 6-0 sandpaper
12. Apply third coat of shellac
13. Allow to dry 8 hours
14. Rub with pumice stone and oil
15. Apply coat of wax
16. Polish with soft cloth





### Varnish Finish

1. Apply coat of stain
2. Allow to dry 6 hours
3. Apply paste filler
4. Wipe off filler across grain
5. Allow to dry 12 hours
6. Apply coat of shellac
7. Allow to dry 8 hours
8. Rub smooth with steel wool
9. Apply coat of varnish
10. Allow to dry 12 to 24 hours
11. Rub smooth with 6-0 sandpaper
12. Apply second coat of varnish
13. Allow to dry 24 hours
14. Rub with 6-0 sandpaper
15. Apply third coat of varnish
16. Allow to dry 24 hours
17. Rub with pumice stone and oil
18. Apply coat of wax
19. Polish with soft cloth





## THE LUMBER

In storing lumber in the school workshop, two factors are important: first, the lumber should be laid straight, and not subject to warping or twisting; and second, lumber should be protected against a change in the moisture content. Storing lumber depends more or less upon the space available for it; no matter how you store it make sure it is arranged so that air can circulate around it.

### Figuring Lumber:

Lumber is rough sawed into standard lengths and widths. The standard lengths are 8', 10', 12', 14', 16', and 18'. The standard widths are 2", 4", 6", 8", 10", and 12". Other lengths and widths can be obtained, especially in planks of thin boards.

When giving the dimensions of stock the thickness is always given first, then the width and the length last.

Lumber is measured and sold by a unit of measure known as the board foot which is the equal of a piece 1" thick X 12" wide X 12" long.

### Formula:

$$\text{Board Feet} = \frac{T'' \times W'' \times L'}{12''}$$

T - thickness in inches; never less than 1".



## THE LUMBER

In storing lumber in the school workshop, two factors are important: first, the lumber should be laid straight, and not subject to warping or twisting; and second, lumber should be protected against a change in the moisture content. Storing lumber requires care on both the space available for it; for if no matter how warm it were it is arranged so that air can circulate around it.

### Storing Lumber:

Lumber is usually sawed into standard lengths and widths. The standard lengths are 2', 10', 12', 14', 16', and 18'. The standard widths are 2", 4", 6", 8", 10", and 12". Other lengths and widths can be obtained, especially in quantities of large orders.

When giving the dimensions of stock the thickness is always given first, then the width and the length last. Lumber is measured and sold by a unit of measure known as the board foot which is the equal of a piece 1" thick, 12" wide X 12" long.

### Formula:

$$\text{Board Feet} = \frac{T \times W \times L}{12}$$

T - thickness in inches; never less than 1".

W - width in inches.

L - length in feet; if L is given in inches the denominator is 144 instead of 12.

Some special kinds of stock, such as moldings, are sold by the linear foot, and other stock, such as shingles and laths are sold by the bundle. Plywood, veneers, and wallboard are measured in square feet.

Finished Lumber:

Lumber, after it has been smoothed by large planers, is designated as finished lumber. Running the boards through the planers removes a portion of wood from each surface, usually  $3/32$ " from the face and about  $3/16$ " from the edges. This is why dressed lumber is somewhat less than the size originally cut from the log. For example, a board sawed 1" x 2" is, after finishing more nearly  $3/4$ " x  $1\ 5/8$ " but it is referred to as a 1" x 2" board. Lumber that is less than 1" thick is considered as 1" and lumber between 1" and 2" thick is considered as 2" in computing board measure.



REVENUE BOND

STATE OF TEXAS

1900

THE STATE OF TEXAS, County of \_\_\_\_\_, do hereby certify that the within and foregoing is a true and correct copy of the original as the same appears from the records of the said County.

Attest my hand and seal of office this \_\_\_\_\_ day of \_\_\_\_\_, 1900.

\_\_\_\_\_, County Clerk.

\_\_\_\_\_, Notary Public.

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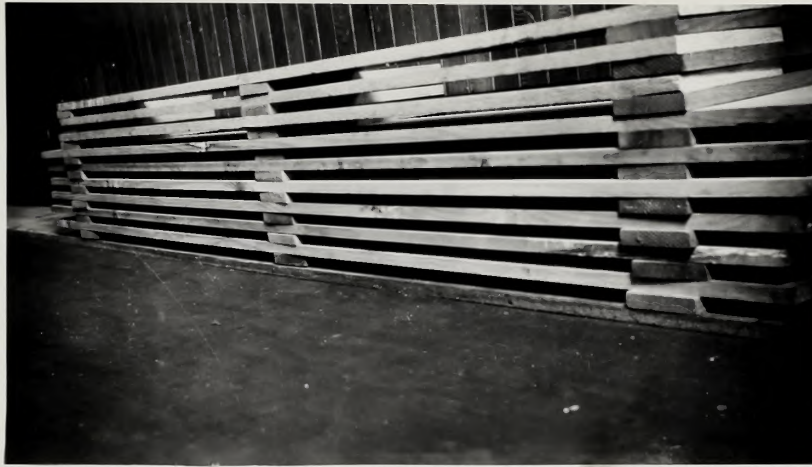
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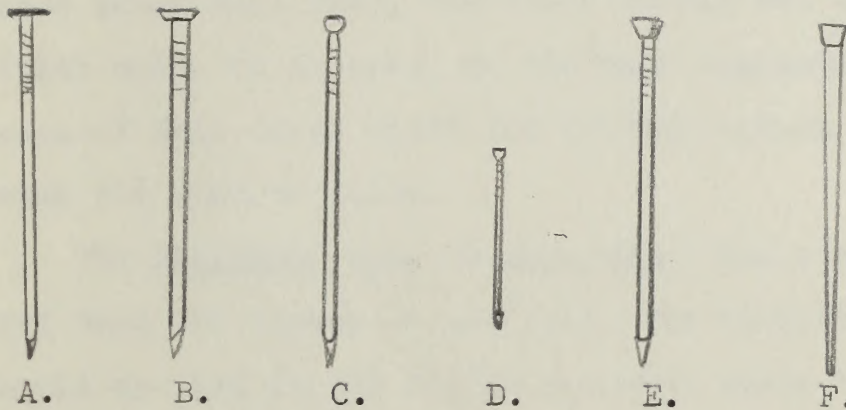
Correct storage arrangement for lumber.





Corrected original statement for January.

## THE NAIL



A. Box Nail

B. Common Nail

C. Finishing Nail

D. Wire Brad

E. Casing Nail

F. Square Cut Nail

Nails and brads are made of soft steel wire. They are made in many shapes and sizes to suit the many different needs. The length of small nails or brads, is usually stated in inches. Common nails have standard diameters, but small nails and brads can be purchased in many diameters. Nails are sold by the pound.

The Common nail is an "all purpose" nail. It is used on rough or outside work where strength is important. Its large diameter and large flat head give it excellent holding



THE NAIL



- A. Box Nail
- B. Common Nail
- C. Finishing Nail
- D. Casing Nail
- E. Screw Cut Nail
- F. Wire Nail

Nails and brads are made of soft steel wire. They are made in many shapes and sizes to suit the many different needs. The length of small nails or brads, is usually stated in inches. Common nails have standard sizes, but small nails and brads can be purchased in many diameters. Nails are sold by the pound.

The common nail is an "all purpose" nail. It is used on rough or uneven work where strength is important. Its large diameter and large flat head give it excellent holding

qualities. It is not used on finished work, because the head cannot be "set" below the surface of the wood.

The Box nail is very similar to the common nail except that it is more slender. Like the common nail, it has a large flat head, therefore should not be used on finish work. It is used, as the name suggests, in making boxes of thin wood, where the heavier common nail would cause the wood to split.

The Finishing nail or Wire brad, has a much smaller head than the common or box nail. The finishing nail should be used on all finish woodwork where the head is "set" below the surface of the wood. It can be purchased in various lengths from 3/16 to 3 inches. Standard wire guage numbers are used for the diameters. It should be remembered that the larger the guage number, the smaller the diameter of the nail. There seems to be set rule as to the difference between a brad and a finishing nail, but finishing nails smaller than 1 3/4 inches in length, are usually called brads.

The Casing nail is similar to the finish nail, but has a larger head which gives it more holding power. The head of this nail coneshaped. This nail is used largely for nailing door and window casings and for fastening other interior trim in place.



...it is not used as finished work, because the  
...cannot be used below the surface of the wood.  
The ... is very similar to the common nail,  
except that it is more slender. Like the common nail, it  
has a large flat head. Therefore it should not be used on  
finished work. It is used, as the name implies, in  
boxes of thin wood, where the heavier common nail would  
cause the wood to split.

The ... or ... is a thin ...  
head than the common or box nail. The ...  
should be used on all finished surfaces where the head is  
"set" below the surface of the wood. It can be, however,  
in various lengths from 1/2" to 1 1/2". It is used where  
large numbers are used for the diameter. It should be  
remembered that the larger the gauge number, the smaller  
the diameter of the nail. There seems to be no rule as  
to the difference between ... and a finishing nail,  
but thinking with ... than 1 1/2" ...  
are usually called brads.

The ... is similar to the finishing nail, but  
has a lower head which gives it more holding power. It  
head is ... than the common nail. This nail is used largely  
for nailing doors and window casings and for finishing work  
inserted into the place.

The Square Cut nail is used largely for nailing large hinges in place on rough construction work. It has more holding power when clinched than the common round nail.





## THE WOOD SCREW

Screws are made of soft steel or brass. Brass screws are used in places where steel screws are likely to rust. Screws are sold by the dozen or by the gross.

The length of the screw varies from 1/2" to 6" and there are many different diameters for each length. The length is stated in inches, and the diameter in guage numbers. Unlike the nail, the smaller the guage number the smaller the diameter of the screw.

The flat head screw is made so that the head of the screw sets even with or slightly below the surface of the wood. The hole for the flat head screw is countersunk to fit the shape of the head of the screw. The flat head screws are made of natural bright steel, brass, blued steel, or japanned finish.

The round head screw is not used in a countersunk hole. The head extends above the surface of the wood. It is also made of natural bright steel, brass, blued steel, or japanned finish.

The oval head screw is especially designed for fastening hardware to wood. The underside of the screw makes it possible in a countersunk hole in metal, and the top of





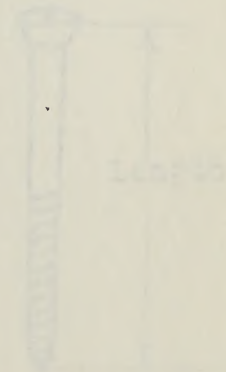
the head leaves no rough or sharp edges to catch and tear the clothing. This screw is also made of bright steel, brass, blued steel or japanned finish.



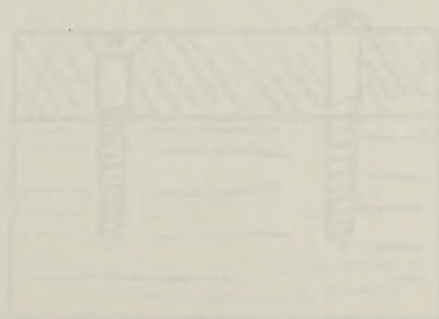
Flat Head



Round Head



Oval Head

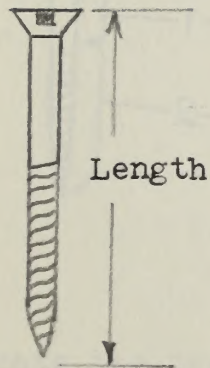




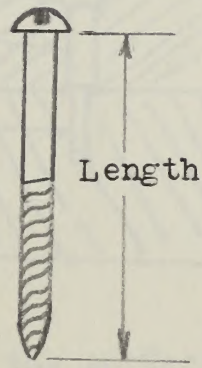
121

The head leaves no rough or sharp edges to cover and fasten the clothing. This screw is also made of bright steel, brass, blued steel or japanned finish.

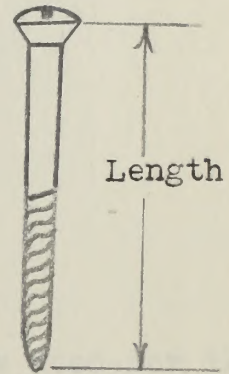
## THE WOOD SCREW



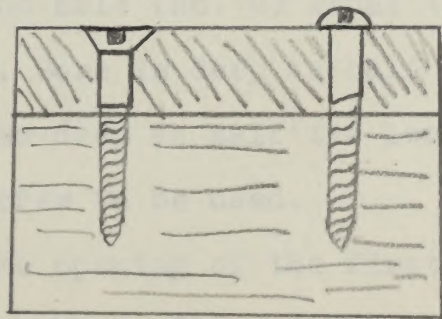
Flat Head



Round Head



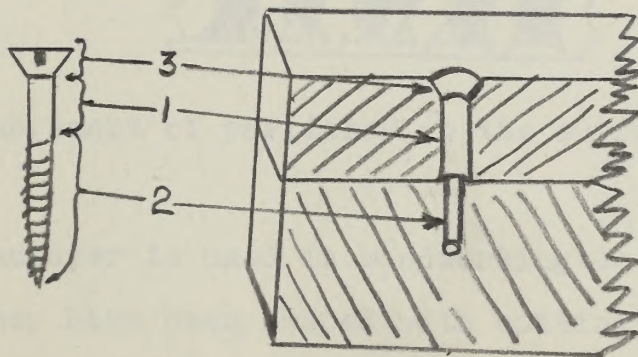
Oval Head







### To Fasten Two Pieces of Wood Together With Screws:



1. Locate the position on the surface of the wood for the screw hole.
2. Bore the first hole (No. 1) should equal the diameter of the smooth part of the screw, so that the screw can be pushed into the hole with your fingers.
3. Bore the second hole (No. 2) equal to the root diameter of the thread. Bore as deep as half the length of the thread. Bore as deep as half the length of the threaded part of the screw to be used.
4. Countersink the opening of the first hole to match the diameter of the head of the screw as indicated by No. 3.
5. Drive the screw tightly in place with a screw driver that properly fits the slot in the head of the screw.





## THE SANDPAPER



Arrangement of particles on the surface of sandpaper

Sandpaper is used in woodworking to smooth surfaces after they have been shaped with cutting tools. It is made of various grades of paper or cloth. The abrasive is held to the paper with glue, or for waterproof papers, with a synthetic adhesive. Nearly all sandpaper was formerly made of flint abrasive, but garnet is now used extensively.

The grit size of the abrasive determines the smoothness of the surface obtained. Grit sizes range from No. 8-0, extremely fine, to No. 3 $\frac{1}{2}$  extremely coarse. Sandpaper comes in standard sheets of 9" by 11" and is sold by the quire, or if large quantity is purchased it can be bought in a roll of various widths and lengths.

Sandpaper should not be used as a substitute for a cutting tool such as a plane, chisel or other edge tool; it should be used only to secure a fine surface after the cutting tools have been used. Never use an edged tool on a surface that has been sanded.

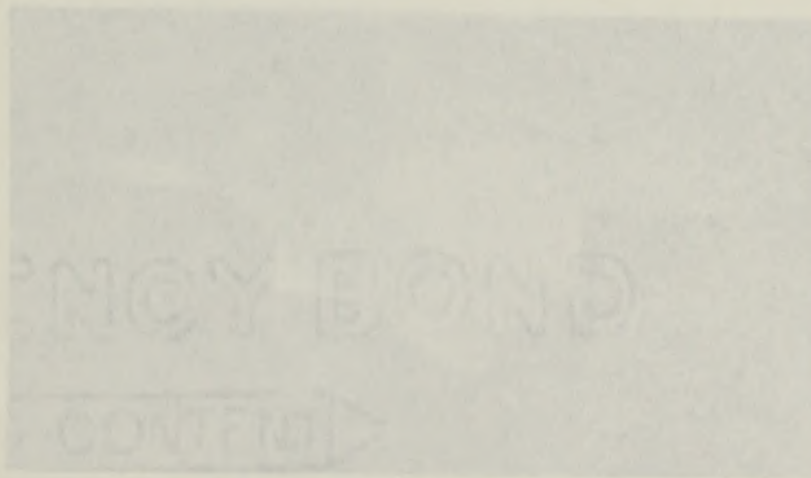




A piece of sandpaper should be held on a block of wood shaped to the desired shape of the surface to be sanded to insure thorough and uniform sanding of this surface.

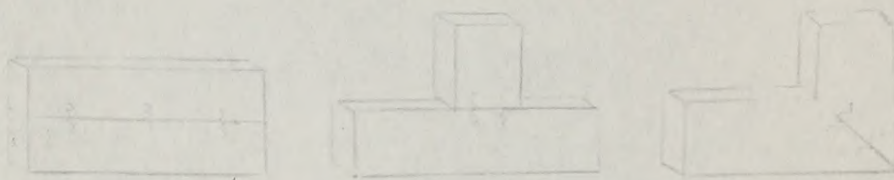


Further sandpaper with a finer grain.



Wearing sandpaper on the ends of a handle.





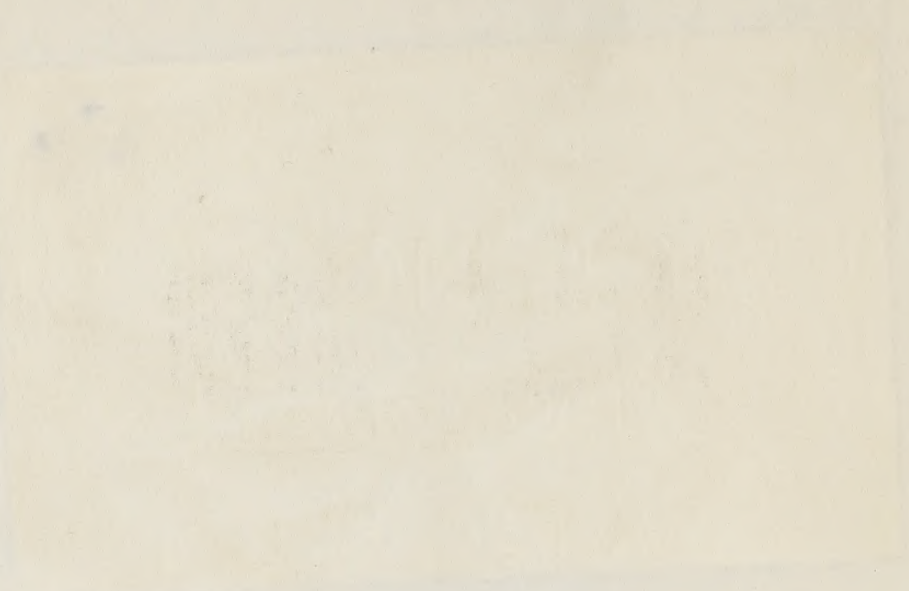


Tearing sandpaper with a frame square.

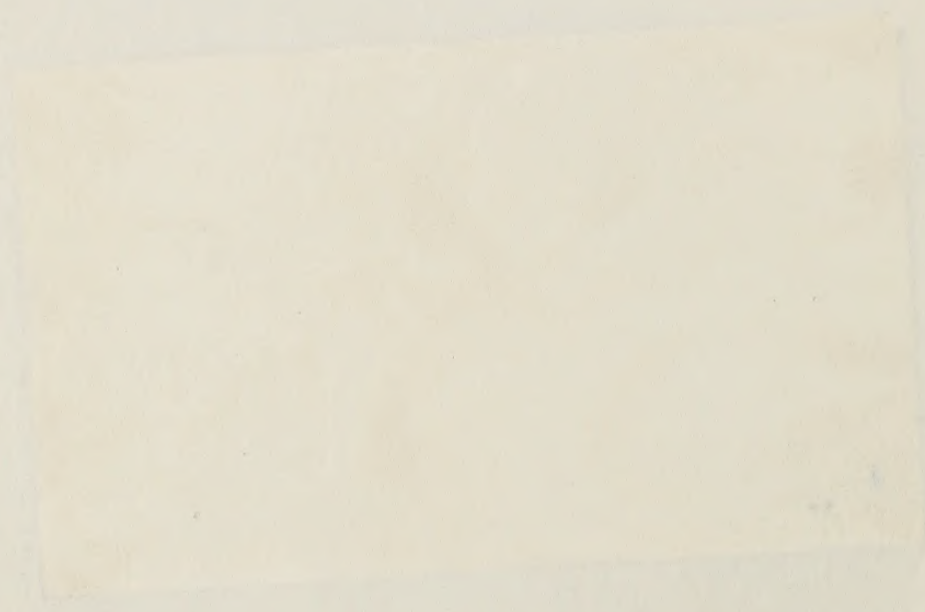


Tearing sandpaper on the arris of a bench.



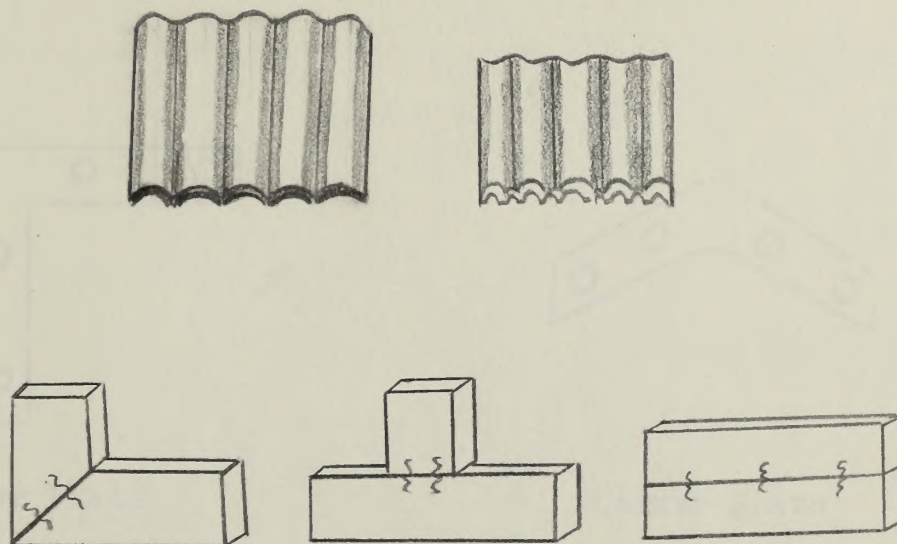


Testing sandpaper with a frame square.



Testing sandpaper on the side of a bench.

## THE CORRUGATED FASTENER

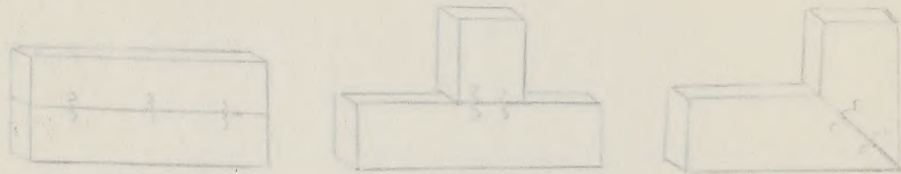


The corrugated fastener is a piece of corrugated mild steel, sharpened on one edge. It can be driven into wood across any flat joint and thus makes a rapid, cheap method of holding joints together. It is made in sizes from  $\frac{1}{2}$  to 2 inches in length and  $\frac{3}{8}$  to  $\frac{3}{4}$  in width.

It should be driven by light blows from a medium-weight hammer. Each blow should be evenly distributed over the top or driving end so that it enters the wood evenly.

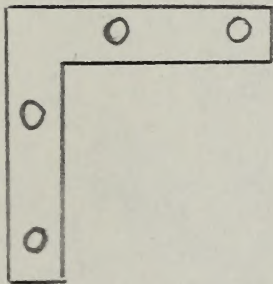


# THE CORRUGATED METHOD

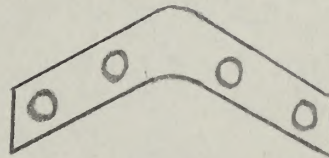


The corrugated method is a piece of corrugated metal  
 sheet, sharpened on one edge. It can be driven into wood  
 across any flat joint and thus makes a tight, cheap method  
 of holding joints together. It is made in sizes from 1/2 to  
 2 inches in length and 1/8 to 1/2 in width.  
 It should be driven by light blows from a medium-weight  
 hammer. Each blow should be evenly distributed over the top  
 or driving end so that it enters the wood evenly.

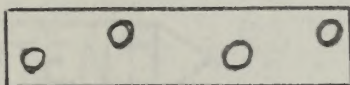
Plates and Braces Used for Fastening and Strengthening  
Joints



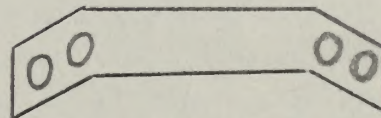
Corner Plate



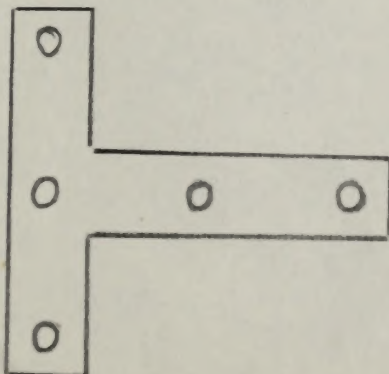
Corner Brace



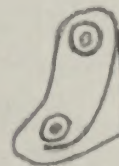
Mending Plate



Angle Brace



Tee Plate



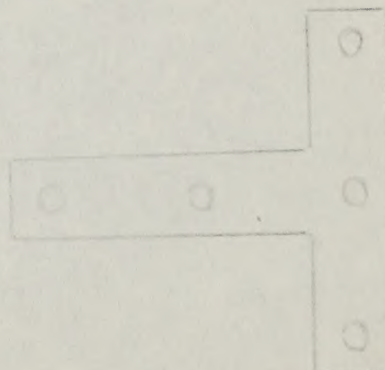
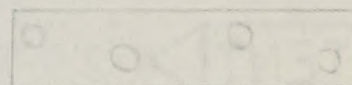
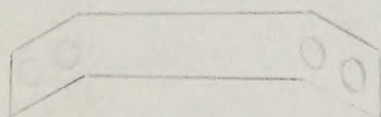
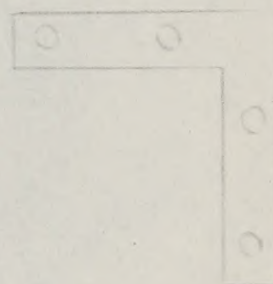
Corner Brace



PAO CONTENT

A. B. & C.

1. The first of the three is a simple L-shaped piece.



Sample Projects for the Low Group

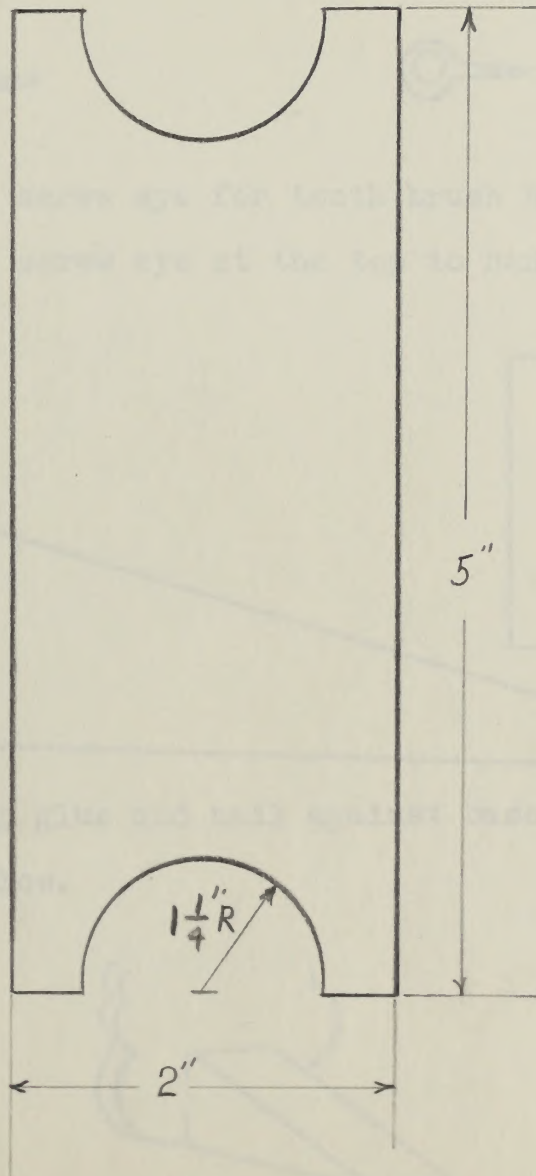
Mental Age - Seven years or below





String Winder

Made of 1/4 or 1/2 inch stock.





Section 1

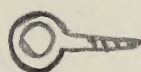
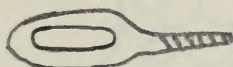
Back of 1/4 or 1/2 inch stock



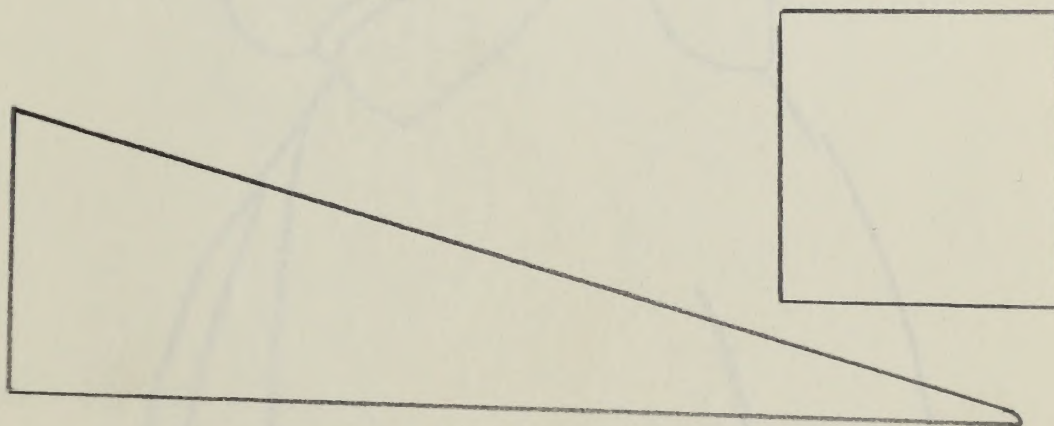
Tooth Brush Holders or Door Stops

Made from 1/4 to 1/2 inch stock

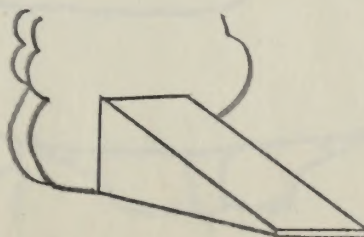
The following three designs can be either used for tooth brush holders or door stops.



Put in large screw eye for tooth brush holder at spot marked, and small screw eye at the top to hang by.



For door stop glue and nail against base block of wood as illustrated below.

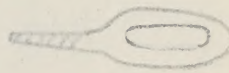
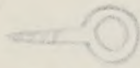




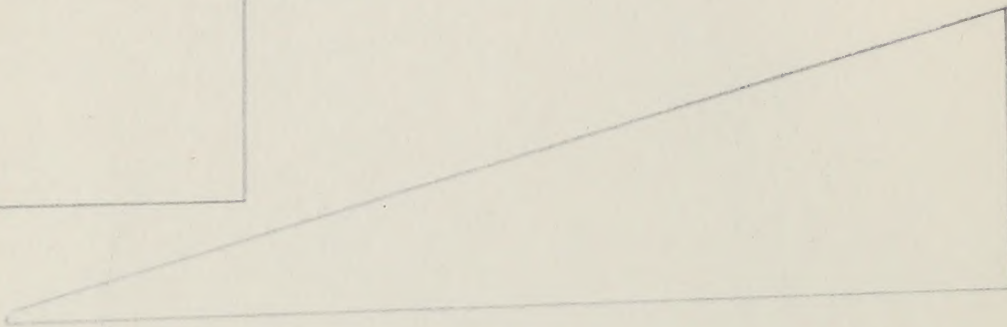
TOOTH BRUSH HOLDERS OR DOOR STOPS

Each from 1/2 to 1 1/2 inch thick

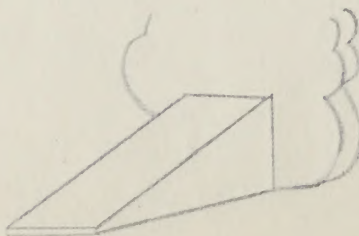
The following three designs can be either used for  
tooth brush holders or door stops.



Put in large screw eye for tooth brush holder at end  
marked, and small screw eye at the top to hang by.



For door stop glue and nail against base block of wood  
as illustrated below.



Actual Size





Actual Size



Actual Size

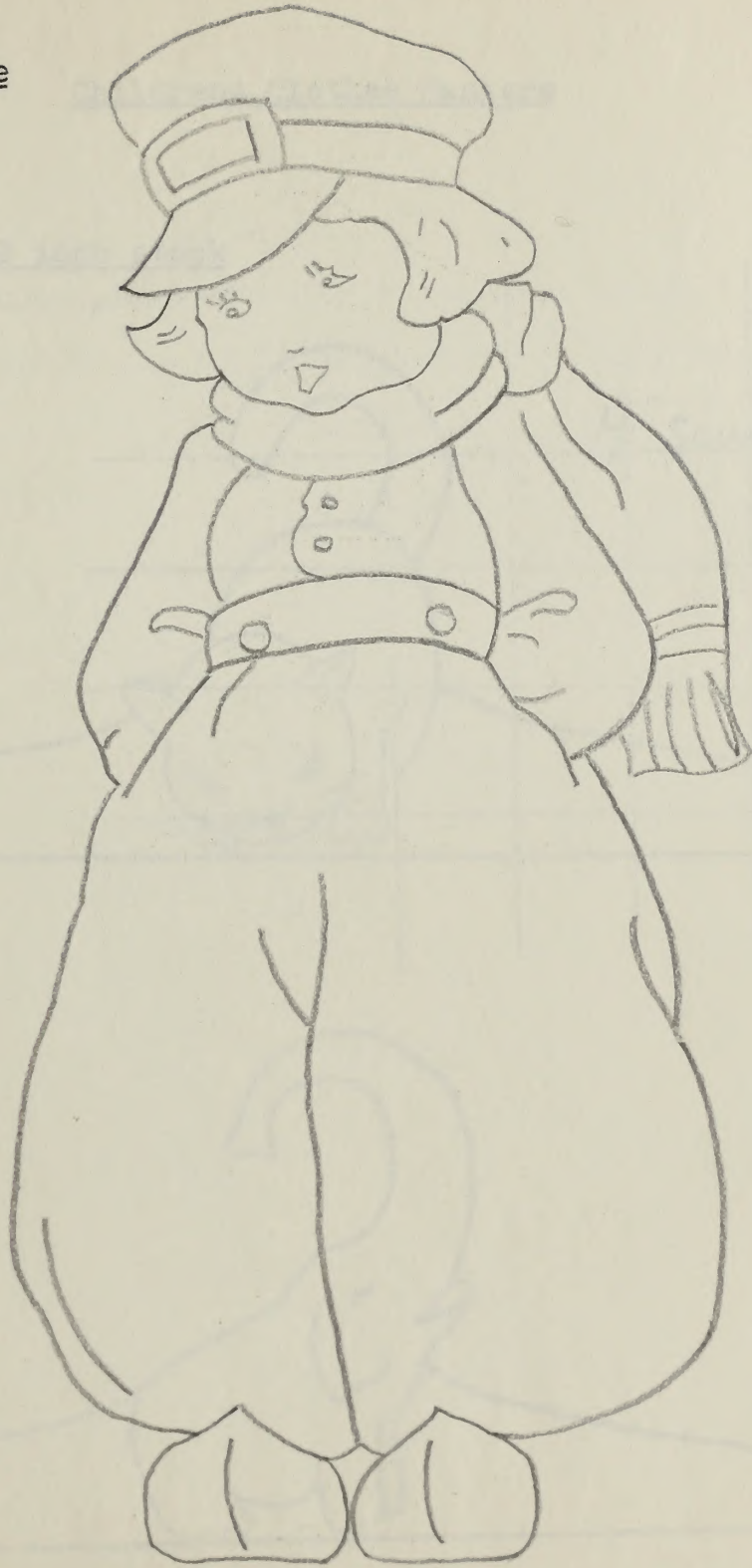




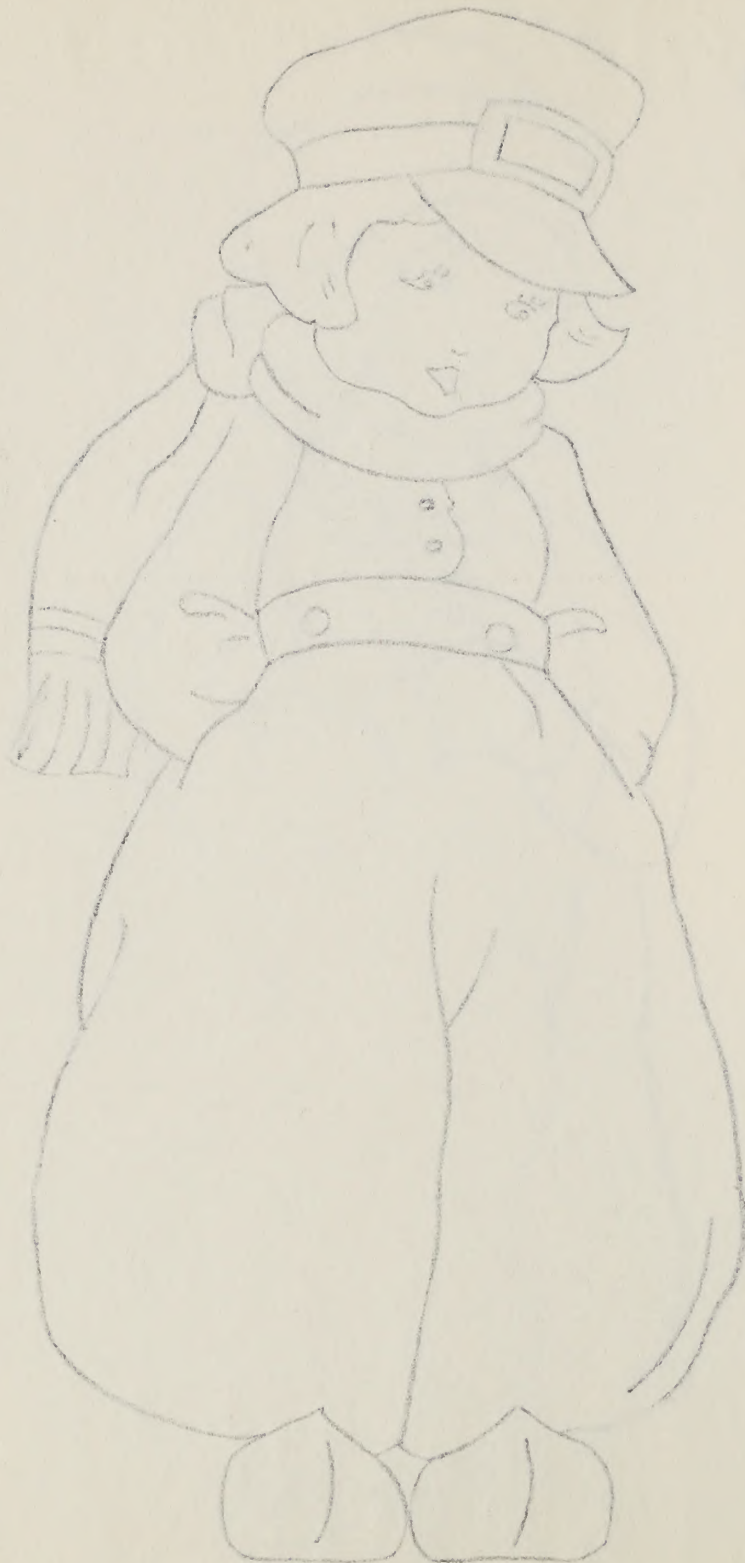


OSIE LINDA

Actual Size



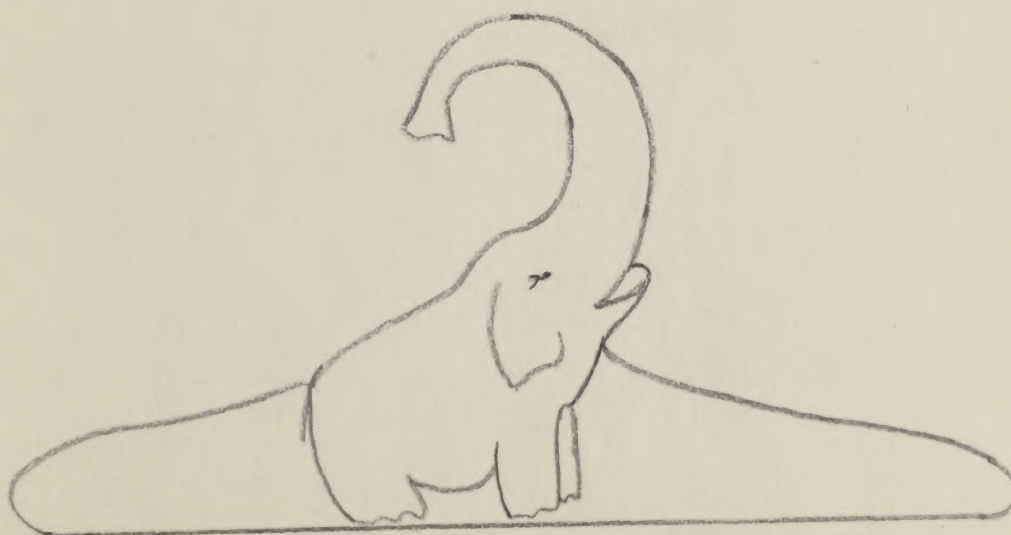
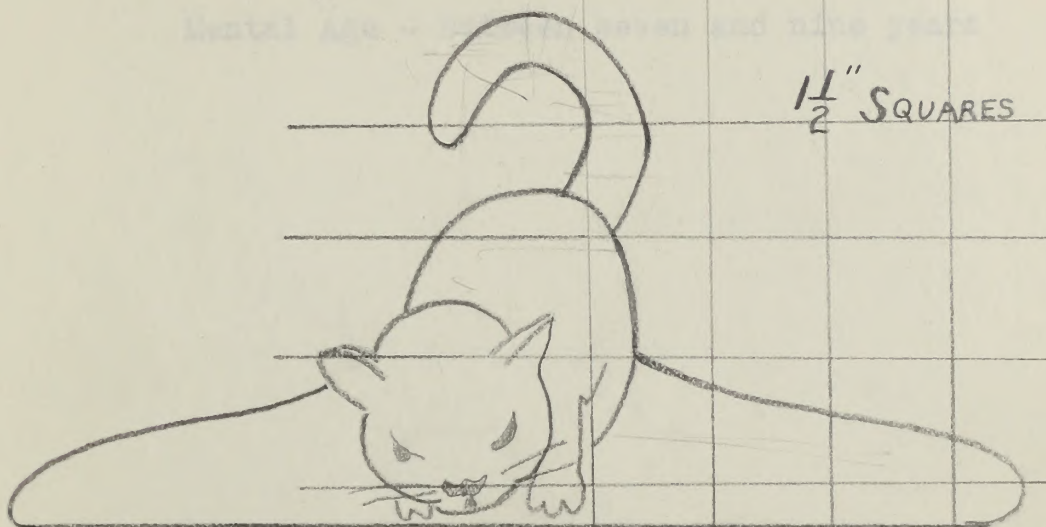




PAIR LADIES

Childrens Clothes HangersMade of 1/2 inch stock

ply-wood

 $\frac{1\frac{1}{2}}{2}$  SQUARES

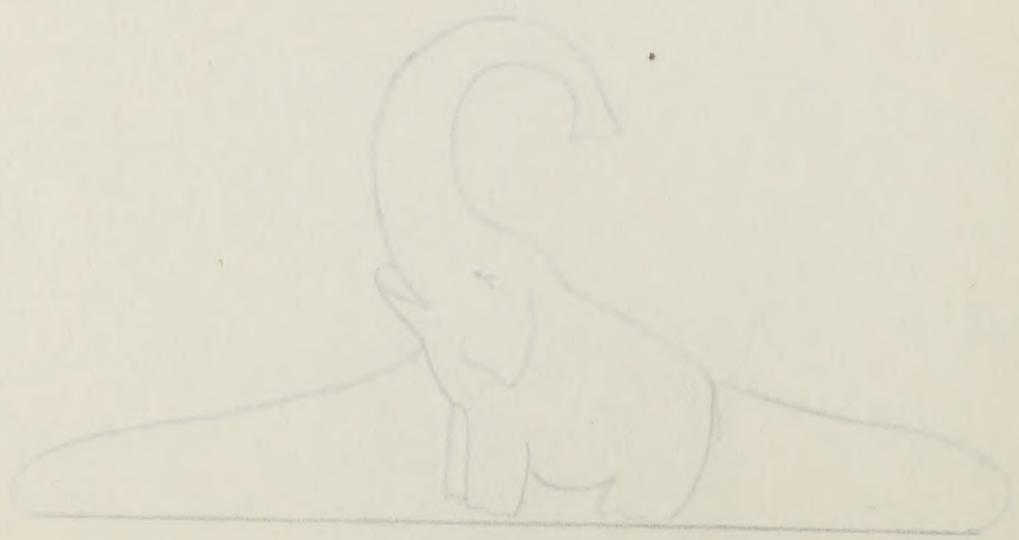


Children's Clothes Patterns

Made on 1 1/2 inch paper



$\frac{1}{5}$  SQUARES



Sample Projects for the Middle Group

Mental Age - Between seven and nine years

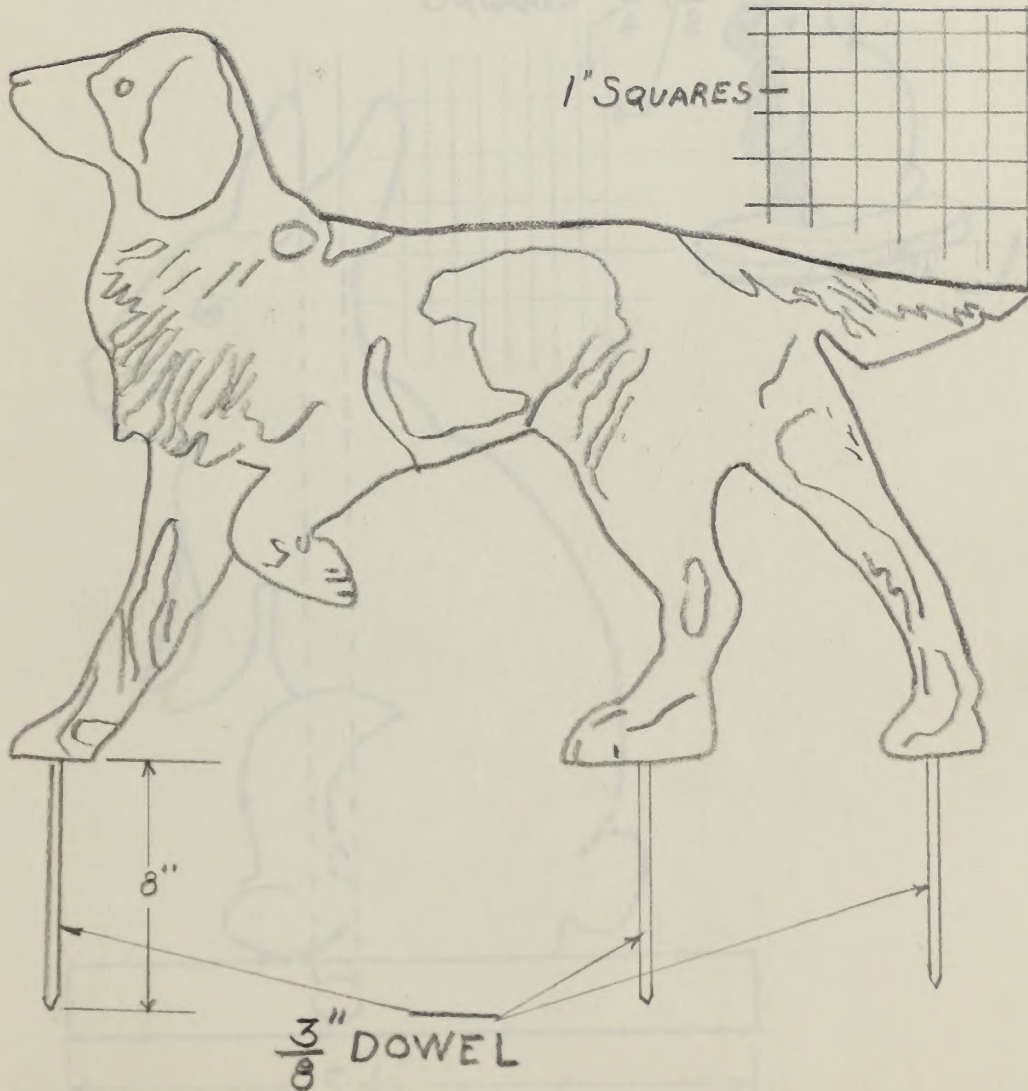






Lawn Ornament

Made of from 1/2 to 3/4 inch stock

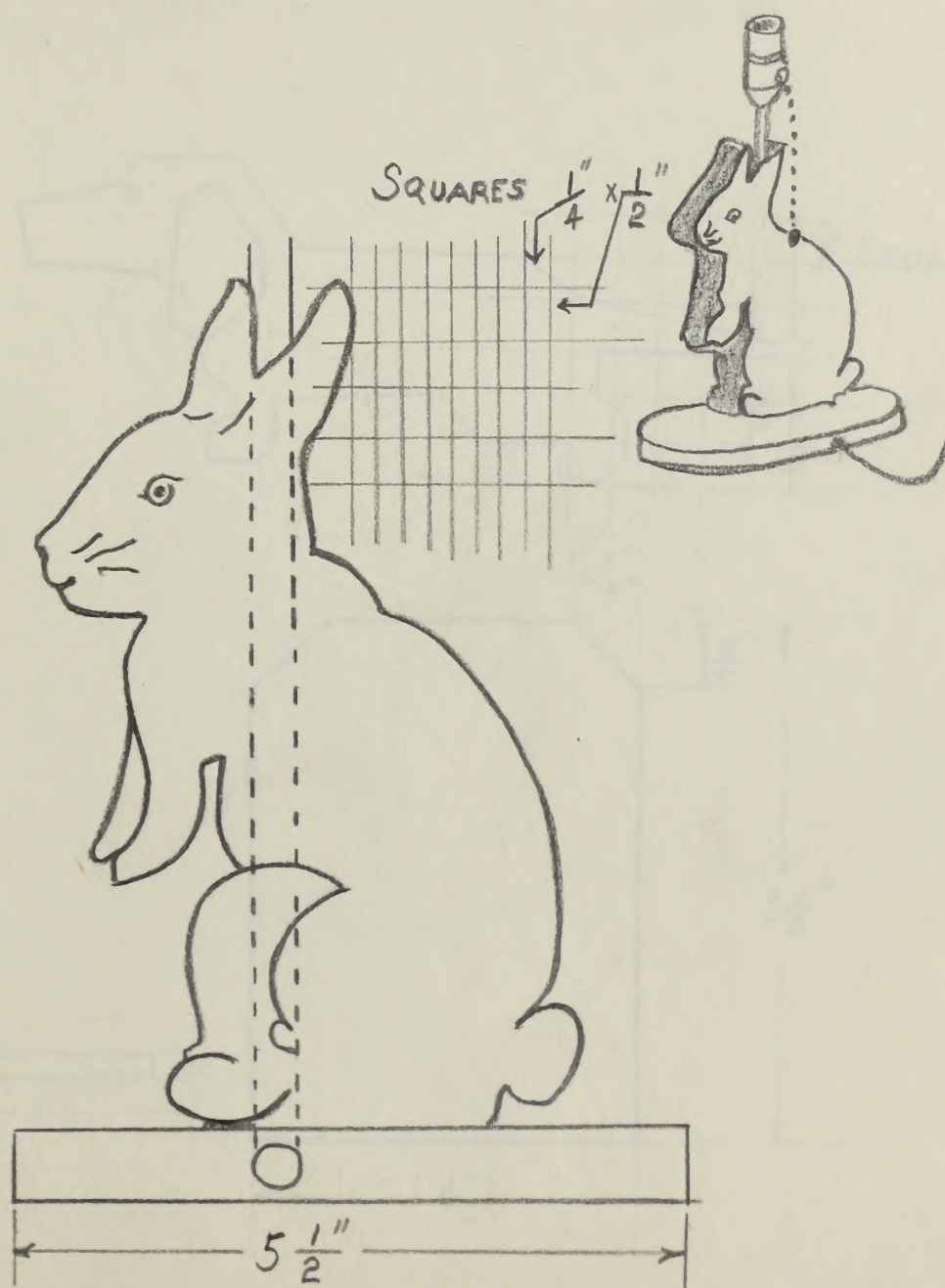






# The Bunny Lamp

Made of 1 inch stock.

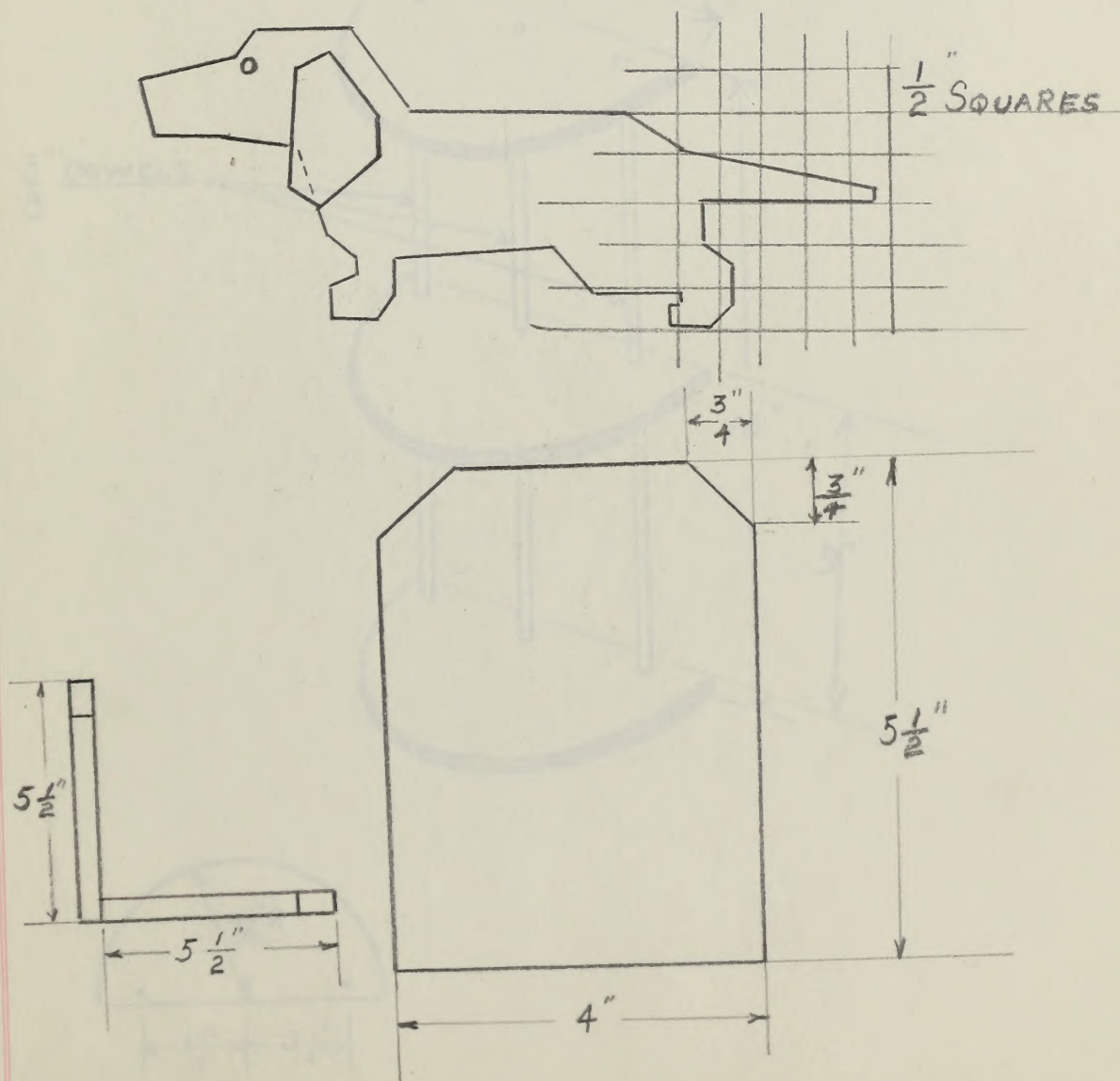






Dog Book Ends

Made of 1 inch stock.

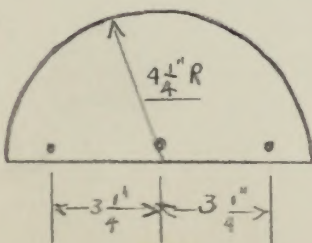
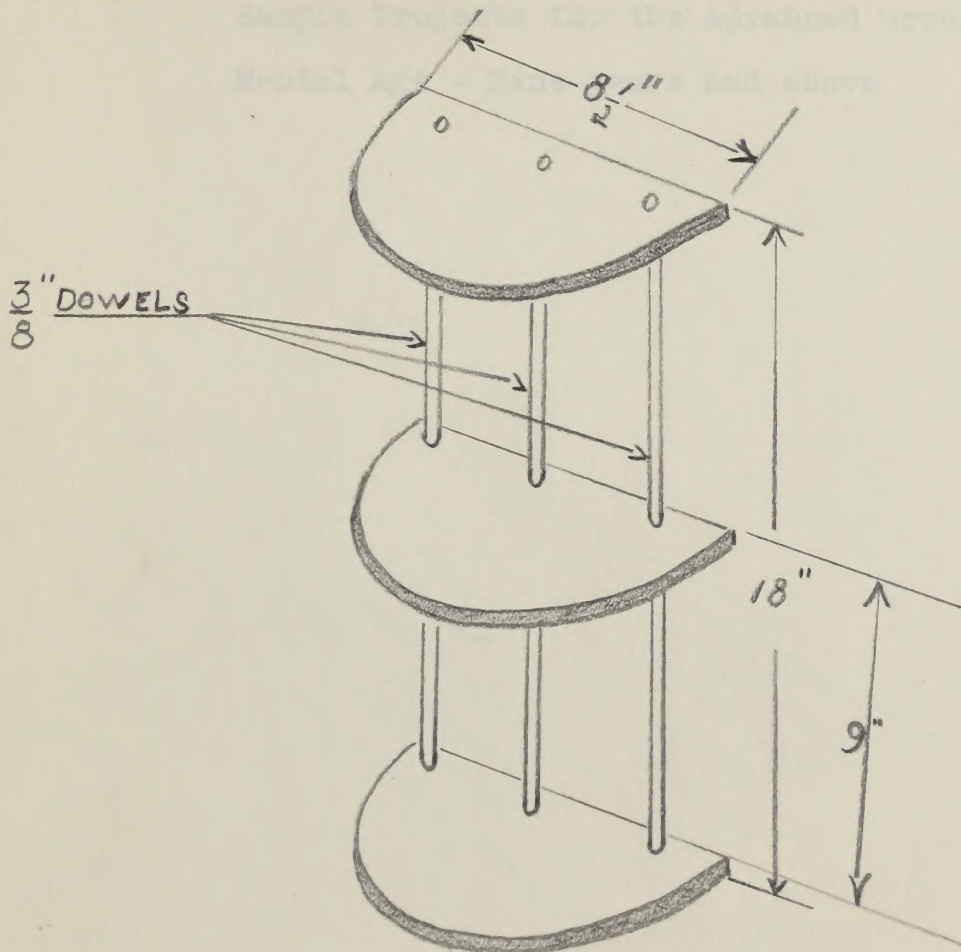






# Knick Knack Shelf

Made of 1/2 inch stock.







Page of 1 inch stock.

Sample Projects for the Advanced Group  
Mental Age - Nine years and above

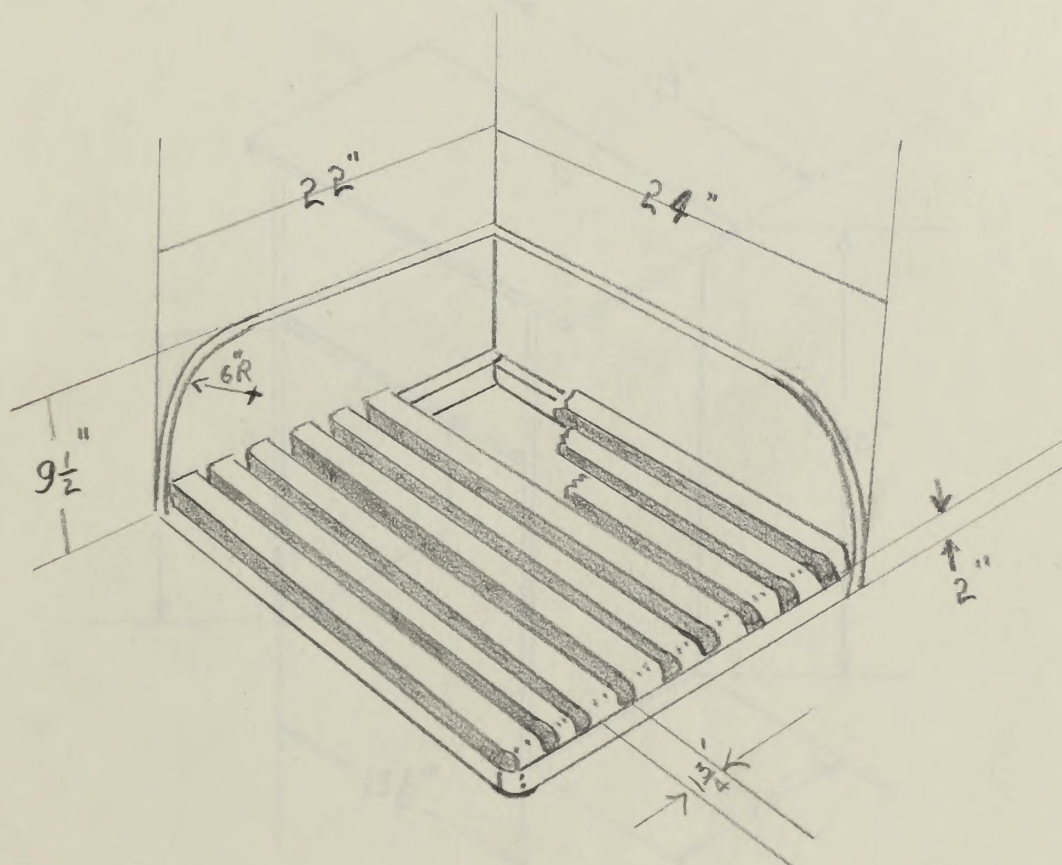






Dog Bed

Made of 1 inch stock.

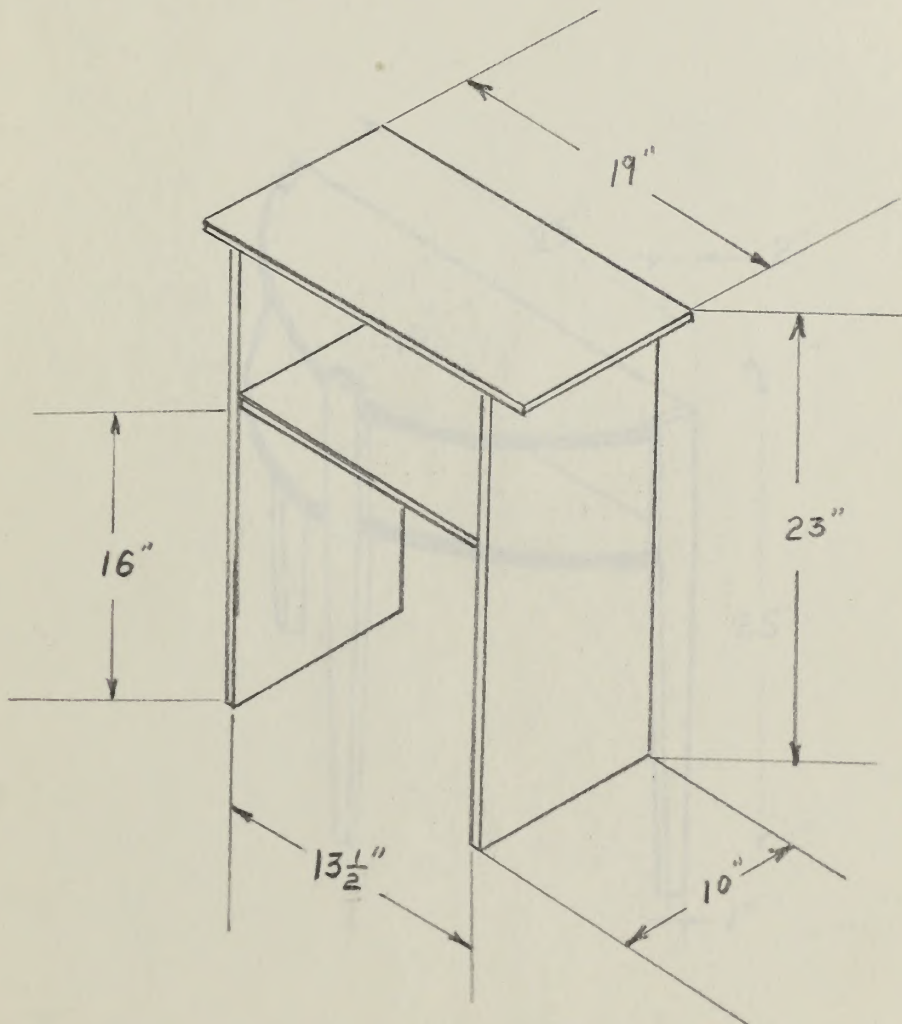






Telephone Table

Made of 1 inch stock.



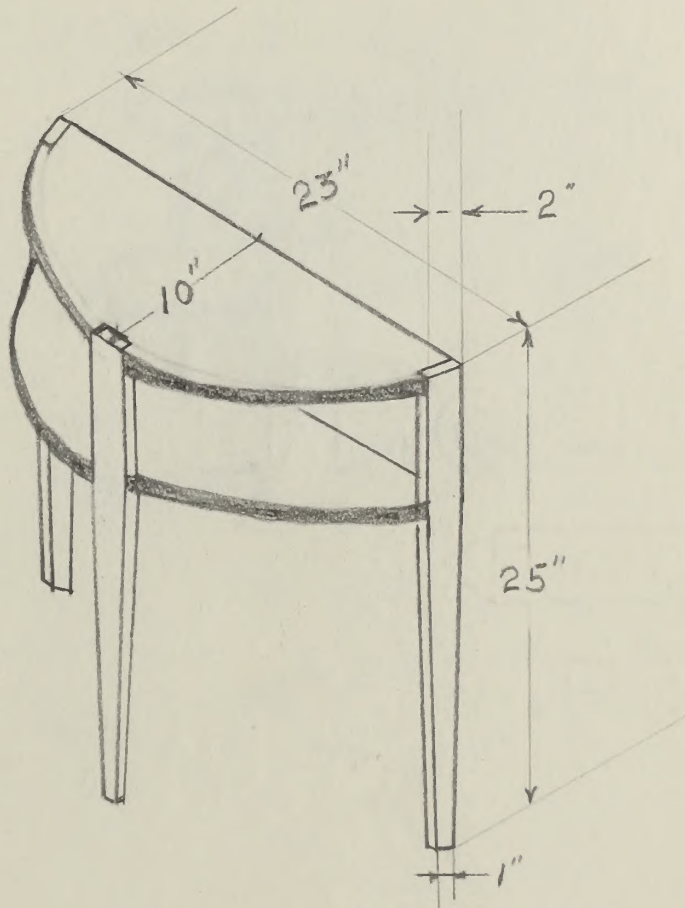




End Table

Top and shelf made of 1 inch stock.

Legs made of 1/2 inch stock.

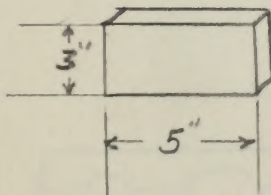
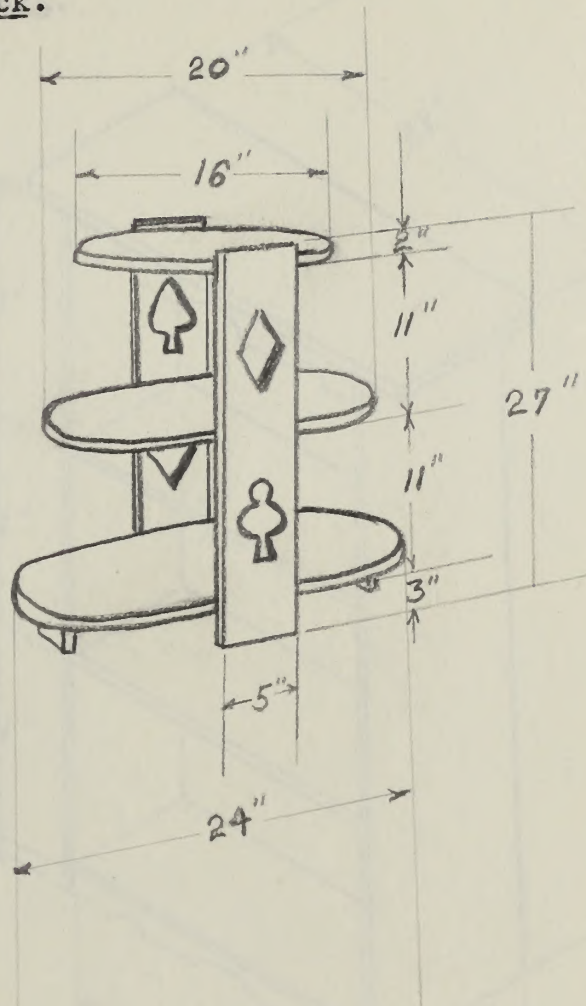






End Table

Made of 1 inch stock.

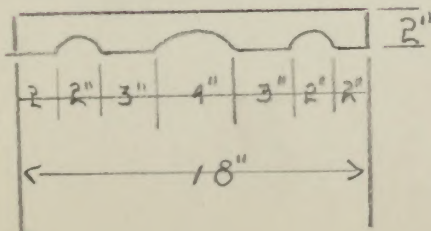
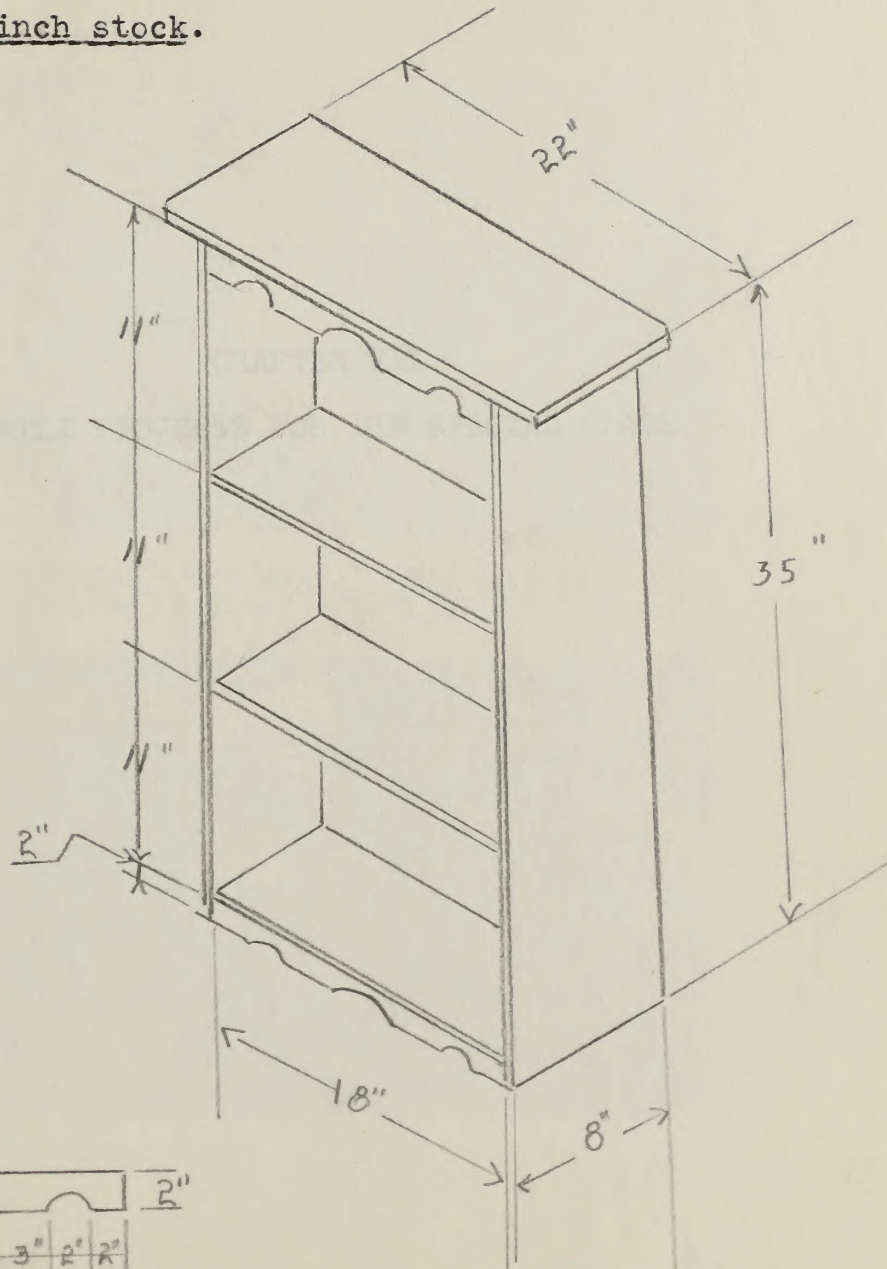






# Book Case

Made of 1 inch stock.

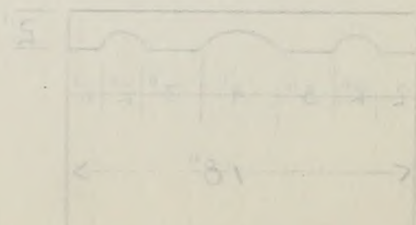
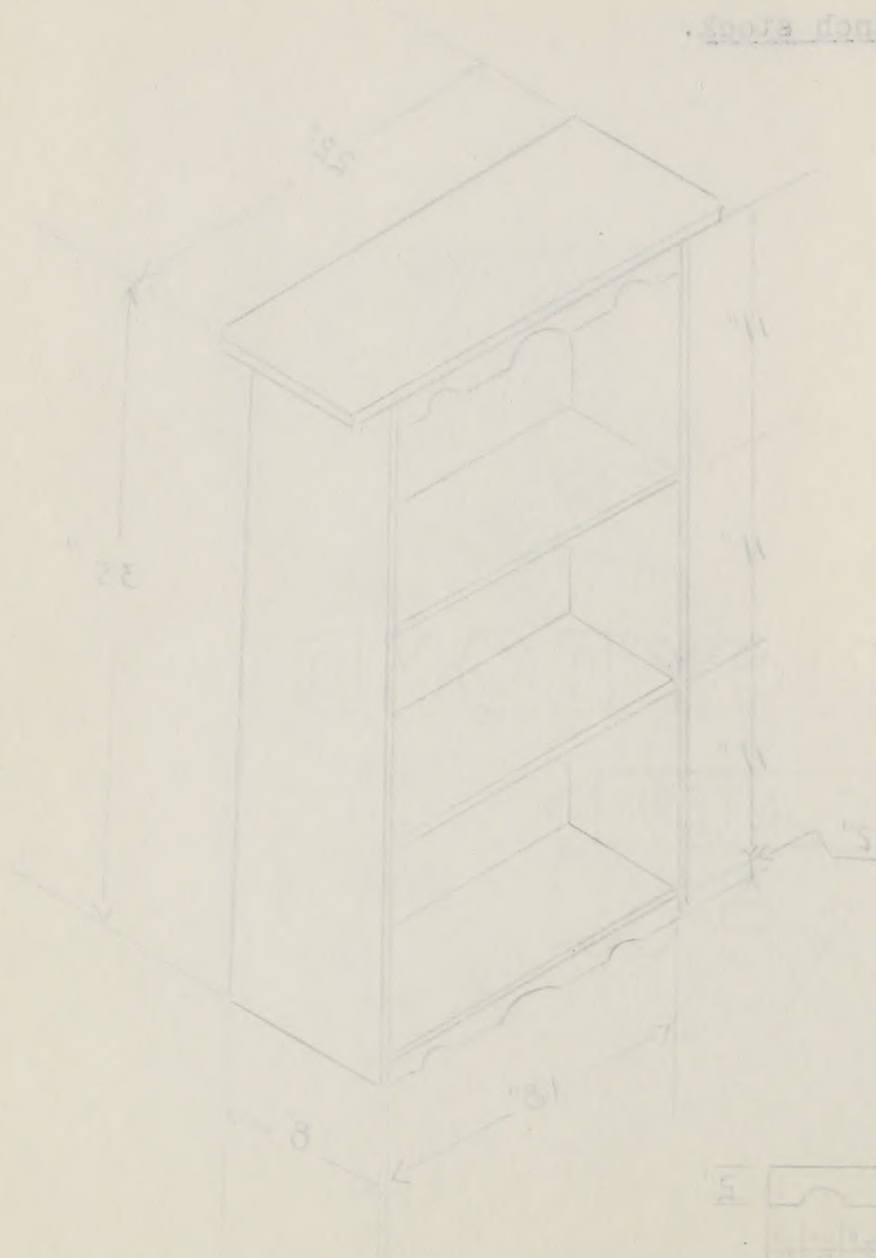




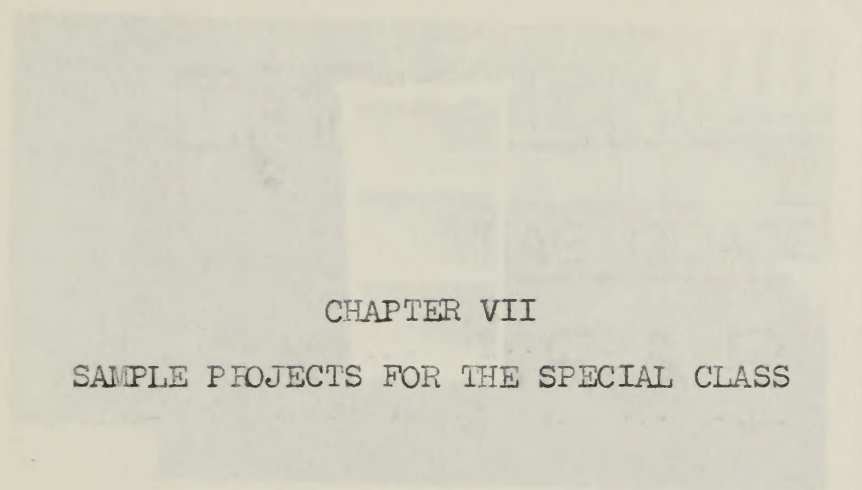
121

Book Case

Side of 1 inch stock



Pictures of a Few Projects Made in a Special Class



## CHAPTER VII

### SAMPLE PROJECTS FOR THE SPECIAL CLASS





EFFICIENCY BOND

THE COMPANY

A. B. & R. CO.

EFFICIENCY BOND

THE COMPANY

A. B. & R. CO.

Pictures of a Few Projects Made in a Special Class

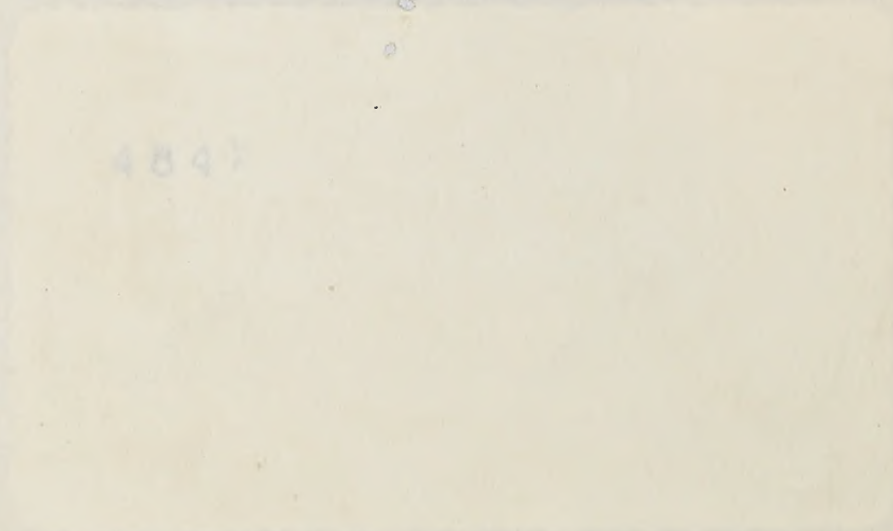




Figures of a few Projects Made in a Special Class



SS



4847









The proper way to store projects in the back of the classroom.





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